



UNITED STATES NAVY

Medical News Letter

Vol. 51

Friday, 9 February 1968

No. 3



CONTENTS

MEDICAL ARTICLES

Malaria Discipline As Prophylaxis	1
Management of Patients With Cancer of the Thyroid	3
Fatal Opportunistic Fungus Disease	6
Role of Temperature in Tropical Immersion Foot Syndrome	9
Malaria—Potential Importance to Civilian Physicians	12

MEDICAL ABSTRACTS

Acute Hyperparathyroid Crisis	15
Combined Radiotherapy, Surgery and Chemotherapy in Carcinoma of the Bladder	15
Treatment of Hepatic Injuries	15
Studies of Venereal Disease	16
Principles of Current Management of Primary Gout	16

DENTAL SECTION

Preventive Periodontics	16
Hot Tongue Syndrome	17
Personnel and Professional Notes	18

NURSE CORPS SECTION

Nursing Care of the Child With Cancer	18
---	----

RESEARCH SECTION

Director of Research Division, BuMed, Retires ...	21
---	----

PREVENTIVE MEDICINE SECTION

Trials of Five Antibacterial Creams in the Control of Nasal Carriage of <i>Staphylococcus Aureus</i>	22
Yellow Fever in Africa	23
Rabies in Vietnam	25
Smallpox Alert	25
Prevention of Cholera	26
Know Your World	27

EDITOR'S SECTION

Medical Texts Requested	28
Magnesium	28
Amateur Radio Operation Aboard Hospital Ships..	29

United States Navy
MEDICAL NEWS LETTER

Vol. 51

Friday, 9 February 1968

No. 3

Vice Admiral Robert B. Brown MC USN
Surgeon General
Rear Admiral R. O. Canada MC USN
Deputy Surgeon General
Captain J. J. Downey MC USN, Editor
William A. Kline, Managing Editor
Contributing Editors

Aerospace Medicine	Captain Frank H. Austin MC USN
Dental Section	Captain H. J. Towle, Jr. DC USN
Nurse Corps Section	CDR E. M. Murray NC USN
Occupational Medicine	Captain N. E. Rosenwinkel MC USN
Preventive Medicine	Captain C. H. Miller MC USN
Radiation Medicine	Captain B. K. Hastings MC USN
Research Section	Captain B. F. Gundelfinger MC USN
Reserve Section	Captain C. Cummings MC USNR
Submarine Medicine	Captain B. K. Hastings MC USN

Policy

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, sus-

ceptible to use by any officer as a substitute for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C. 20390 (Code 18), giving full name, rank, corps, old and new addresses, and zip code.

FRONT COVER: NAVAL MEDICAL RESEARCH INSTITUTE. The Naval Medical Research Institute has been a part of the National Naval Medical Center since the latter's commissioning in 1942, being itself established 28 October 1942 as an activity of the Potomac River Naval Command and as a subordinate command of the Center. Its staff, at first under 100, has grown in 25 years to a level closer to 300, and its budget has increased correspondingly. The Institute which is the largest single research activity in the Medical Department, has conducted studies relating to general medicine as well as to the military medical specialties. The scientists have performed research in basic and applied science as necessary to fill military requirements and operational needs, and provided scientific advice and consultation to the Navy's operational commands. In addition they have assisted field laboratories, naval hospitals and other activities in solving problems beyond local capabilities. Much of the fundamental research has been designed to develop skills and knowledge in anticipation of future military problems. In World War II the use of sulfa drugs and blood plasma expanders, and burn treatment were among the subjects studied to support military medical practice in the field and aboard ship. Over the years there have been studies in bacteriology, bio-energetics, biophysics, chemistry, dentistry, microbiology, parasitology, pathology, pharmacology and radiobiology, physical biochemistry, physiology, radiation technology and virology. Some investigations are in support of clinical medicine, such as organ transplantation. Others pertain to disease prevention, such as malaria, dengue, yellow fever and filariasis. A major recent effort has been devoted to the adaptation of man to new weapons systems, including study of human tolerance to low frequency vibration, development of telemetering devices, and maintenance of the balance of energy in the human body.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

MALARIA DISCIPLINE AS PROPHYLAXIS

*MAJ Phillip E. Winter, MC USA, MAJ Francis C. Cadigan, Jr., MC USA,
Withoon Thiemanun, and LTC Dan C. Cavanaugh, MSC USA,
Milit Med 132(11):917-919, November 1967.*

Introduction

Through the ages man has sought to protect himself from the ravages of disease. In earlier times, the protection of amulet, charm, or talisman was invoked without notable success against the mystical powers which caused illness. With the evolution of modern medicine, rational approaches to the maintenance of health were developed; it became apparent that many disorders could be avoided by the exercise of vigilance and discipline. Eternal vigilance became the price of health, as well as of liberty. With the advent of modern chemotherapy, however, came a resurgence of the ancient attitudes. The hard-learned lessons of the formative years of preventive medicine were often cast aside in favor of the mystical modern amulet, the malaria pill. Man came to depend upon the brief obeisance of pill-taking for protection, freeing himself of the responsibility of vigilance and self-discipline. But it is again becoming apparent that neither amulet nor talisman alone provide protection against disease. Nowhere is this more obvious than in the recent history of malaria in the military.

As a result of experiences in World War II, the concept of multiple barriers was applied to the prevention of malaria in military populations. This concept was aimed at the prevention of access to man of infected mosquitoes. To group-protective measures such as insecticide use, screening of barracks, and brush clearing were added such personal protective measures as bed nets, clothing and its proper use, and repellents. This came to be known as malaria discipline and depended greatly upon individual responsibility and initiative. With the advent of an effective chemoprophylactic (chloroquine) many became convinced that this simple pill, regularly taken, could obviate the rigors of

malaria discipline. However, recent demonstration of the high prevalence of chloroquine-resistant malaria in Thailand, and increasing reports of its frequency elsewhere re-emphasize the point that chemoprophylaxis is the *second* line of defense, the first line being prevention of access to man of mosquitoes.

Method of Research

This paper describes observations made on three groups, living in close association but under widely different conditions with regard to anti-malaria precautions. These observations were made as an adjunct to another research project and serve to illustrate the value of such precautions.

The study group was drawn from a U.S. Army Engineer company, a Royal Thai Army Engineer company, and Thai civilian construction workers and their families. These groups were engaged jointly in a road building project in a hilly jungle area southwest of Korat, Thailand. In August 1965, the two engineer companies established adjacent camps on a remote stretch of undeveloped road within 1 km (0.6 mile) of a small native settlement. With the influx of civilian construction workers, most of whom chose to live near the newly established camps, the native village rapidly grew to a population of approximately 150 to 200 persons. The area had been previously recognized as one where malaria was highly endemic among the relatively sparse indigenous population. Therefore, stringent anti-malarial protective measures were instituted for the U.S. personnel. In addition to weekly prophylaxis with the combined chloroquine-primaquine tablet, these measures included clearing of underbrush in a wide radius around the camp site, construction of well-screened barracks, mandatory use of bed nets, nightly fogging with insecticide, and imposition of a curfew to insure that all personnel would be in a barracks prior to the peak biting time of the probable mosquito

From the SEATO Medical Project, U. S. Component, APO San Francisco 96346.

vector (*Anopheles balabacensis*) in the area. In the Thai Army camp, the anti-malarial precautions taken were clearing of underbrush and the provision of bed nets. Since this was considered a base camp, by Thai Army regulation, no chemoprophylaxis was used. To some extent, this camp received the benefits of the insecticide applications to the adjacent U.S. Army camp. The third population group, the civilian workers, were essentially unprotected since they were not under the control of either Army unit, with regard to living conditions.

During the next year, the US Army group was under close observation by their own medical personnel and by teams from the SEATO Medical Research Laboratory. As opportunities arose, observations were also made upon the two other groups residing nearby. Observations on the latter groups were not systematic, nor did they employ the same accurate detection techniques as used for the US Army group. In addition, medical care was not uniformly available, and case reporting was undoubtedly incomplete, more so for the civilians than for the Thai Army group. For these reasons the data gathered from the two Thai groups are properly regarded as low estimates of morbidity, and the difference in rates as probably the minimum difference. Rates expressed are only approximate: populations of the three groups fluctuated throughout the year, but on the average there were about 150 U.S. soldiers, 100 Thai soldiers, and 150 Thai civilians living in the area throughout the year.

No cases of malaria developed in the U.S. personnel during the year of observation; an attack rate of zero. Although all men were examined monthly by means of thick and thin blood films, no evidence was found of asymptomatic parasitemia. During this same period, in the adjacent Thai Army camp, 30 cases of malaria occurred; an attack rate of approximately 300/1000/annum. No information is available as to the incidence of asymptomatic parasitemia.

In the civilian population, 95 cases of malaria, with four deaths, are known to have occurred. This indicates an attack rate of almost 650/1000/annum. Two surveys of the civilians were done to determine the prevalence of parasitemia. In June 1965, at the very beginning of the rainy season, 23 of 50 persons examined were found to be infected with *P. falciparum*. In September, 83 of 175 persons (approximately 47 percent)

were found infected. Twelve cases were treated with 1500 mg of chloroquine base and followed for eight days. Six of these continued to have parasitemia. Although these numbers are small, the response is consistent with our findings in other areas of Thailand in which 35 percent to 50 percent of *P. falciparum* infections did not respond to chloroquine treatment.

Although the techniques for identification of malaria cases were not the same in each group, the bias would be such as to minimize the differences in rates. The strictest search for infection and disease was in the group which had no cases; the greatest case loss was in the group which had the highest rate, since the civilians could go to other physicians or hospitals or use self treatment. Thus, we feel that although the numbers may not be exact, the rates are a valid indication of the differences.

Discussion

The differences in these groups are striking, and appear to relate directly to the extent of anti-malarial precautions used. The group with extensive, strict anti-malaria discipline had no cases, that which used less extensive precautions had an attack rate of 300/1000/year, and that which had no organized anti-malarial precautions had a rate of 650/1000/year. The magnitude of the potential risk to the military personnel is indicated by the high case rate and high point prevalence of parasitemia in the civilians who lived and worked in the same surroundings. No point surveys were done on the intermediate group, but the US group was negative on monthly checks throughout the year, whereas almost half of the civilian population was positive on the two occasions when checked. It is extremely unlikely that chemoprophylaxis alone was responsible for the lack of cases in US soldiers, since a high proportion of infections in civilians did not respond to full treatment doses of chloroquine.

Summary

This study constitutes a dramatic example of what constant attention and strict malaria discipline can achieve. It demonstrates vividly that the use of multiple barriers between the soldier and the mosquito can provide complete protection even in highly malarious areas, and that as necessity, or neglect, reduce the number of barriers, rates can

be expected to rise. The ideal prophylaxis cannot be achieved by medical personnel alone, but requires the interest and attention of the entire command structure. Undoubtedly military and economic circumstances may prevent attainment of the ideal, but every available precaution should be instituted to minimize malaria morbidity.

Acknowledgment

We wish to thank the Commanding Officer of the 538th Engineer Battalion, and especially the Commanding Officer and men of Company C of that Battalion, for their cooperation in the study upon which this report is based.

(The references may be seen in the original article.)

MANAGEMENT OF PATIENTS WITH CANCER OF THE THYROID

JAMES EWING SOCIETY PRESIDENTIAL ADDRESS, 1967

Theodore Winship MD, Cancer 20(11):1815-1818, Nov 1967.*

Carcinoma of the thyroid is not a common disease. The incidence based on statistics from death certificates shows that the death rate in this disease is approximately one per 100,000. Of course, these figures do not show the prevalence of the disease among the living. This is unknown because published statistics vary so greatly. The reported occurrence of carcinoma in nontoxic nodular goiters varies from 3.6 to 17.1% and in solitary nodules from 9 to 33%. These data concern only surgical patients and do not apply to the general population.

The wide variation in figures is due to inaccuracy in distinguishing clinically between single and multiple nodules of the thyroid and to the unavoidable selection of cases. Some of the disparity is also due to the lack of uniform criteria for evaluating pathologic findings. Certainly the low incidence of malignant tumors in some areas reflects the failure of pathologists to recognize cancer of the thyroid.

Probable Population With Disease

For more than 50 years it has been assumed that cancer of the thyroid was more frequent in goitrous than in nongoitrous regions. No large-

scale investigation has been carried out but the few limited surveys conducted in the last 15 years indicate that cancer of the thyroid is equally distributed throughout all areas and has no relationship to goitrous regions. The reported inequality appears to be related to local interest in the disease rather than any geographic differences.

Carcinoma of the thyroid rarely is associated with thyrotoxicosis. Malignant tumors are found in approximately 2½% of toxic goiters whether they be nodular or diffuse in morphology.

Like other disorders of the thyroid, cancer is found predominately in women. Approximately 65% of all patients with cancer of the thyroid are women. Presumably this is associated with the influence of estrogenic hormones though their increased production during pregnancy apparently does not accelerate the growth of cancer of the thyroid.

Thyroid nodules are uncommon in men but, when present, are three times more likely to be carcinoma than similar nodules in women. Nodules in children also should be viewed with suspicion. It has been estimated that almost 50% of nodules in children are malignant. Although the majority of patients are in the fifth and sixth decades of life, approximately 15% are younger than 30 years. In the series of 850 childhood cancers of the thyroid which Winship and Rosvoll have collected during the last 20 years, two patients were aged 4 months when the diagnosis was established and 12 chil-

* Surgical Pathologist, Washington Hospital Center, Associate Clinical Professor of Pathology, George Washington University, Washington, D.C.

Presented at the twentieth annual meeting of the James Ewing Society, New York, N.Y., April 14, 1967.

Supported by Public Health Service grant CA 09263-15 from the National Cancer Institute.

Address for reprints: 110 Irving Street, NW, Washington, D.C. 20010.

dren had tumors at birth which later proved to be carcinoma.

In most instances the etiology of cancer is not known; however, in the case of cancer of the thyroid it is now generally acknowledged that previous radiation may result in the production of a malignant neoplasm. In 1949 Quimby and Werner suggested such a relationship. Since then, numerous investigators have verified their thesis. In the collected series of childhood thyroid carcinomas the clinicians attempted to obtain a history of previous radiation to the head and neck area in only about half of the patients. Of this group 74% had been treated by roentgen-ray therapy from 3½ to 14 years before the diagnosis was established. Doses ranged from 140 to 2600 R with an average of 512 R. In the greatest number of cases roentgen therapy had been directed to the mediastinum and neck during infancy for a so-called enlarged thymus gland. The second largest group had been treated during early childhood for enlarged tonsils and adenoids while others received treatment for hemangiomas, acne, eczema, nevi and numerous other benign lesions. The average interval between radiation and the histologic diagnosis of cancer was 8½ years.

Though thyroid cancers have been produced in animals by the use of both roentgen-rays and radioactive iodine, malignant tumors have not been produced by radioactive iodine in the human. At this time there is no explanation for what appears to be a different effect from equivalent amounts of external and internal radiation. The hazards of I¹³¹ in the young have not been delineated. Too few patients have been followed for a sufficient period for a definitive statement to be made concerning the safety of even small amounts of radioactive iodine. Therefore, it would be advisable to employ radiotherapy in any form with great caution in the head and neck region of young people.

Classification Of Tumors

The treatment of carcinoma of the thyroid depends to a large extent on the histologic type. For this reason it is well to have an understanding of the classification of cancers of the thyroid. Malignant tumors of the thyroid can be classified in three groups:

1. Papillary—62%;
2. Follicular—20%;
3. Undifferentiated—18%.

Included in the papillary category are all cases showing papillations. These tumors are almost always mixed and multiple sections show varying numbers of functioning follicles. Follicular carcinomas are composed of malignant follicles only. The undifferentiated carcinomas are a more heterogeneous group and comprised those malignant tumors with neither papillations nor follicles. These tumors are likely to be solid and to have a uniform cell type in contrast to the well-differentiated cancers. There are many variants in this category but there are three main subgroups: small cell, medullary and the uncommon spindle and giant cell carcinomas. Except for some of the medullary tumors, these are highly malignant and rapidly growing cancers.

Carcinoma of the thyroid usually is manifested first by a nodule in the neck, either in the thyroid or in a cervical node. In adults the nodule is more apt to be in the thyroid whereas an involved cervical node is usually the first sign of disease in children. The evaluation of thyroid nodules depends to a large extent on physical examination. Radioiodine scans are of limited value since they seldom detect cancers less than 2 cm and the majority of cold areas prove to be degenerating nodules or microfollicular adenomas.

Treatment

For practical purposes the well-differentiated tumors of the thyroid (papillary and follicular) can be treated alike. Virtually all aspects of therapy for these types can be discussed on the basis of the management of a single nodule in the thyroid gland. Obviously a painless, slowly growing lymph node in the neck which reveals metastatic thyroid carcinoma will lead to surgery on the thyroid. Whether the nodule is in the lateral cervical region or in the thyroid, adequate therapy should be undertaken and an attempt made to eradicate the cancer. As adequate therapy we accept a lobectomy for a small cancer involving only one lobe. The routine removal of the isthmus together with a total lobectomy is advisable. If at the time of operation an abnormal contralateral lobe is palpated, then and only then should a "near-total" lobectomy be performed on the opposite lobe. A "near-total" lobectomy removes all the thyroid tissue except for a remnant in the tracheoesophageal groove which will tend to protect the parathyroid glands. If it becomes necessary later to ablate the thyroid, this can be accomplished with a relatively small dose of radioactive iodine. Hypoparathyroidism is

sometimes a worse disease than papillary carcinoma.

The large majority of investigators have found bilateral involvement in 20 to 33% of glands rather than the 87% reported by Clark and associates. Tollefsen and DeCosse routinely perform a lobectomy and neck dissection for differentiated cancer of the thyroid. After a 10-year follow-up of a large series, only 3.7% of their patients had developed recurrent tumor in the remaining contralateral lobe. Therefore, total thyroidectomy is seldom necessary and should not be performed routinely.

After the lobe has been removed, it should be submitted for frozen section if this service is available. The diagnosis of carcinoma of the thyroid is somewhat difficult by frozen section but it usually can be established and this is helpful in determining the need for immediate further surgery. When the diagnosis of carcinoma has been made by frozen section, the surgeon should open the carotid sheath and examine carefully for enlarged lymph nodes. If none is found, no further procedure should be carried out at this time.

If disease is demonstrated in the lateral cervical nodes, a neck dissection should be performed immediately. It is usually not necessary to do a classical radical neck dissection including the sternomastoid muscle and internal jugular vein as is done for carcinoma of the tongue or the floor of the mouth. In most cases of papillary and follicular carcinoma the sternomastoid muscle is not involved and a satisfactory modified neck dissection can be performed leaving it intact. If involved nodes are present on both sides of the neck, a bilateral modified neck dissection is indicated.

Patients with undifferentiated thyroid cancer are usually in the older age group and seldom present themselves for treatment before the tumor is extensive. In this situation it is recommended that as much of the tumor as possible be resected. Roentgen-ray therapy can be used for controlling residual disease and for palliation.

In some institutions all patients with cancer of the thyroid receive prophylactic or therapeutic roentgen-ray therapy postoperatively. How much effect this has had on the survival of the patients is difficult to evaluate; however, Sheline et al. and Smedal and associates have described some very favorable results in patients whose tumor was not amenable to surgical excision. There is also a growing series of children with known residual

carcinoma who have been controlled for long periods by the judicious use of roentgen therapy. This is of special value in those patients in whom carcinoma must be left on the larynx or trachea.

Radioactive iodine is often of value in the treatment of patients with inaccessible metastatic follicular carcinoma. It is not generally appreciated that papillary carcinomas may contain a large follicular element, enough in some cases to pick up therapeutic amounts of I^{131} . There are now 21 patients in the childhood series whose lungs have cleared after the use of radioactive iodine and some have lived for more than 10 years. All these patients had mixed papillary and follicular carcinoma.

Evaluation of Therapy

It is extremely difficult to evaluate any form of therapy when dealing with cancer that grows as slowly as well-differentiated carcinoma of the thyroid. Many therapists have attempted to control the growth of inaccessible cancer of the thyroid with large doses of desiccated thyroid. Few are enthusiastic about the results and unfortunately this method of therapy has been unsuccessful in our hands.

To evaluate fully the results of therapy in thyroid cancer, it is necessary to follow patients for at least 20 years; however, many authorities have demonstrated that death from this disease most frequently occurs in the first five years. Two factors influence the prognosis in thyroid carcinoma. The first is the cell type and the second is the extent of the disease. In the large group of children nearly all of those with undifferentiated carcinoma died within the first five years. The same was true in the series of 126 adults seen at the Washington Hospital Center. The 10-year survival rate for the adults with cancer of the thyroid is 74% and 85% of the children have lived 10 or more years. Cancer of the thyroid is an unpredictable disease. Two patients have had a recurrence of papillary carcinoma after 20 years and others have lived with carcinoma continuously for more than 35 years.

The existing controversy concerning methods of therapy is due to the tremendous variations in the clinical behavior of cancer of the thyroid and to judgments based upon statistically insignificant numbers of patients inadequately followed. Even

the few investigators with large series are in disagreement. In spite of these differences, evaluation of the published data and personal experience suggest that patients with well-differentiated cancer of the thyroid should be treated conservatively.

Summary

The clinical aspects of patients with cancer of the thyroid were discussed with remarks on etiol-

ogy, physical findings and the relationship between the various cell types and methods of therapy.

Recommendations for conservative surgery were offered on the basis of the natural history of the disease. Comments were made on the effects of radiation on inaccessible cancer of the thyroid followed by a brief discussion of survival.

(The references may be seen in the original article.)

FATAL OPPORTUNISTIC FUNGUS DISEASE

Gerald F. Parkhurst MD and George D. Vlahides MD,
JAMA 202(4):279-281, Oct 23, 1967.

Fatal disseminated mycotic disease has been seen with increasing frequency since the introduction of steroid and cytotoxic drugs, medications that apparently interfere with the immunologic defenses of the host. These mycoses are most often associated with malignant tumors, especially leukemia and lymphoma. Of 14 significant fungus infections found at autopsy, *Phycomycetes* was found in six. Thrombosis and infarction caused by the fungus were seen in multiple organs, most commonly in the lungs, heart, and kidney, and were a major contributory cause of death.

As the complexity of medicine increases, iatrogenic disease follows. In the past 20 years, one of its manifestations has been an overall increase in the incidence of mycotic infections; in many instances, the development of disseminated mycotic infections has resulted in extremely serious complications and death. Most of the fungi involved are opportunistic invaders that occur secondary to debilitating diseases and the administration of medications which have an effect on the immunologic defenses of the host. Many cases of opportunistic mycotic infections caused by a variety of agents have been reported in the recent literature. It is our purpose to comment on some unusual complications of six cases of myeloproliferative disease and fatal disseminated phycomycosis.

Although phycomycosis is relatively new in this country, it is not a new disease, having been described in Europe in the 19th century. The disease is caused mainly by species of *Rhizopus* and

Mucor, both fungi belonging to the class *Phycomycetes*, the order *Mucorales*, and the family *Mucoraceae*. These are bread molds that occur in the soil, in manure, and on fruits, and may be pathogenic for horses, cows, dogs, pigs, and birds, as well as man.

Phycomycosis, as well as aspergillosis and candidiasis, is frequently associated with debilitation, uncontrolled diabetes, and malignant neoplasms, especially lymphomas and the myeloproliferative disorders. Patients with these diseases may die from disseminated fungus disease rather than from the primary disease state for which they are being treated. With the introduction and extensive use of antibiotics, antimetabolites, and corticosteroids, especially the latter, there appears to have been a remarkable increase in the incidence of disseminated fungus disease as a complication in these diseases.

Materials and Methods

This report deals with six patients with blood dyscrasias whose direct or immediate cause of death was disseminated phycomycosis. There were five cases of leukemia and one of aplastic anemia. During the ten-year period from Jan 1, 1956, through Dec 31, 1965, there were 3,429 autopsies performed at the Ellis Hospital. Fourteen significant mycotic infections were encountered. Of these, five were cases of candidiasis complicating leukemia; one was of the same organism complicating diabetes mellitus; and two cases were of aspergillosis secondary to leukemia. The remaining six cases are herein discussed.

From the Ellis Hospital, Schenectady, N.Y.
Reprint requests to 1101 Nott St., Schenectady, N.Y. 12308 (Dr. Parkhurst).

The autopsy protocols, slides, and charts of all patients mentioned in this study were reviewed. All tissue slides were reexamined for fungi. Either methenamine silver, or PAS, or both stains were available in all cases, but the fungi were quite obvious on routine hematoxylin and eosin stains. Identification of *Mucor* was made solely on morphologic characteristics, no cultures being available. It should be noted that such identification to the mycologist is not wholly satisfactory, and that true identification of the etiologic agent can only be established by cultural methods.

The term "mucormycosis" has been widely used to designate infections caused by nonseptate fungi belonging to the class Phycomycetes, family Mucoraceae. Infections caused by morphologically similar species, such as *basidiobolus* which does not belong to the family Mucoraceae, make it obvious that the term mucormycosis is not appropriate. It is now common practice to use the less specific term "phycomycosis" for all infections caused by any member of the class Phycomycetes. In tissue sections, *Mucor* and other members of Phycomycetes occur as relatively broad, nonseptate, branching hyphae that characteristically invade the blood vessels with resulting thrombosis. Other fungi that must be differentiated include *Aspergillus* which has numerous cross septae, is narrower, and branches at more acute angles and in a brush-like fashion. Occasional characteristic conidiophores may be found. *Candida* demonstrates relatively narrow pseudohyphae which are septated, branch less than *Mucor*, and may have prominent club-shaped blastospores.

All of the six patients recorded might be said to have had disseminated phycomycosis in that the number of organs involved ranged from three major organs (case 5) to involvement of eight major organs (case 1). All cases revealed non-septate hyphae invading vessels with thrombosis and infarction (Table 1). The mycotic process was of considerable pathologic significance in every case, being a major immediate contributing cause

TABLE 1.—Organ Involvement by Fungi

Organ	No. of Cases Involved	Thrombosis	Infarction
Lung	6	6	6
Heart	4	3	3
Kidney	3	3	2
Bone marrow	2	1	2
Gastrointestinal tract	1	1	0
Esophagus	1	0	0
Liver	1	1	1
Adrenal	1	1	1
Pancreas	1	1	1
Brain	1	1	1
Spinal cord	1	1	1

TABLE 2.—Most Abnormal Data

Data	Case No.					
	1	2	3	4	5	6
Hemoglobin, gm/100 ml blood	4.2	7.0	6.5	9.0	9.1	6.1
Hematocrit	16	0	20	0	23	24
Leukocyte count per 1 cu mm blood	100	150	1,100	400	205,000	500
Platelets per 1 cu mm blood	31,500	38,000	20,000	40,000	400,000	25,000
Total bilirubin level, mg/100 ml blood	16.5	9.2	38.7	0	Jaundiced	0

of death. For example, three of the cases showed recent myocardial infarction with fungi and thrombi present in coronary blood vessels. Involvement of the lungs in most instances was quite extensive and severe. In the presence of marked thrombocytopenia and hemorrhage, it was paradoxical and startling to find extensive thrombosis and infarction at autopsy. In addition to the fungi, three of the six cases showed many colonies of bacteria.

Examples of the most abnormal laboratory data are given in Table 2. In four of the six cases, jaundice was present. The level of bilirubin elevation may be explained by lysis of the red blood cells in the many hemorrhagic infarcts. Age, sex, underlying disease and its duration, administration of antibiotics, antimetabolites, and corticosteroids are recorded in Table 3. Cases 1 and 3 have been previously commented on, and case 2 has been reported elsewhere.

Report of a Representative Case

Case 5.—A 67-year-old white man was admitted to the hospital complaining of dyspnea, fatigue, anorexia, and weight loss of three months' duration. The significant finding on physical examination was an enlarged spleen. The leukocyte count was 163,000/cu mm of blood, with a preponderance of granulocytes in various stages of maturation. The hemoglobin level was 10.7 gm/100 ml, and the hematocrit reading was 41 percent. Bone-marrow examination confirmed the diagnosis of chronic granulocytic leukemia. A regimen of busulfan (Myleran) was prescribed, and the patient was discharged. He was readmitted five times during the following year for treatment of his disease. A few days before his last admission, he noted weakness of his legs and hemoptysis. The day after admission, a total paraplegia developed in this patient. Neurological examination revealed flaccid paralysis of both lower extremities with complete anesthesia up to the level of T-2. Myelo-

TABLE 3.—Case Reports

Age	Sex	Underlying Disease	Duration of Disease	Medications		
				Anti-biotics	Steroids	Cyto-toxics
62	F	Aplastic anemia	2½ yr	+	+	—
51	M	Lymphoblastoma Lymphoblastic leukemia	1½ yr	+	+	—
84	F	Acute stem cell leukemia	----	+	+	+
28	F	Acute myeloblastic leukemia	3 mo	+	+	+
67	M	Chronic myelocytic leukemia	1 yr	+	+	+
63	M	Acute stem cell leukemia	1 yr	+	+	+

graphy was considered, but the patient's condition never allowed this procedure. In the last few days of his life, he was noted to be jaundiced. On his last hospital admission, he deteriorated rapidly and died on the third day. Additional data are listed in Tables 2 and 3.

At autopsy, there was a large hemorrhagic infarct of the upper lobe of the left lung measuring 9x7x6 cm. Thrombi were present in the vessels supplying this area and in other pulmonary vessels. The heart revealed an infarct in the right anterior ventricular wall with an adherent mural thrombus. The thrombus and many vessels contained numerous nonseptate hyphae. The most unusual finding in this autopsy was in the spinal cord. The cord from T-1 to T-4 was infarcted, with thrombi and hyphae present in adjacent vessels.

Comment

Disseminated phycomycosis is a rapidly fatal disease characterized by invasion of the walls and lumina of blood vessels by the fungus. This disease, which is often associated with debilitation, is becoming more frequent in patients with malignant neoplasms, especially lymphomas; in patients with the myeloproliferative diseases; and in poorly controlled diabetics. Patients with these diseases who are receiving steroids, antibiotics, and antimetabolites may die from unsuspected fungus infection rather than from the primary disease state for which they are being treated. Hutter in 1959 reviewed the literature and listed 110 cases of mucormycosis to which he added four more. Of these, 28 were superficial and involved the skin, nails, and external ear. The remainder were visceral and usually fatal. The visceral infections involved three main areas: pulmonary, gastrointestinal, and head and neck. Eleven of these cases occurred with leukemia and six occurred in association with various types of lymphoma.

A number of factors determine the ability of an individual to resist microbial infection. These include the integrity of the skin and mucous membranes; and cellular elements, either as circulating polymorphonuclear leukocytes and macrophages, or as organized fixed systems, such as the reticulo-endothelial system. The inflammatory process may lead to isolation and destruction of organisms, either directly or through the production of an environment inimical to their growth. Humoral factors, such as properdin, acting in conjunction with complement and magnesium ions can inactivate some bacteria and viruses. Antibodies may not be sufficient to resist infection since the ultimate result, destruction or localization of the invading organism, may depend upon the introduction of antibodies and other defense mechanisms.

All of the patients herein discussed must have had severe immunologic deficiencies. Of the six patients with disseminated phycomycosis, three also had extensive bacterial infections as evidenced by the many bacterial colonies found in tissue sections. In all of these cases there were excellent reasons for diminished resistance to infection. There was widespread involvement of the reticulo-endothelial system, and bacterial infections in such individuals has been well documented.

There is a high incidence of hypogammaglobulinemia in the lymphoproliferative diseases. It has been suggested that patients with lymphoproliferative diseases and Hodgkin's disease have a disorder which deranges the immune system and results in deficient resistance. This makes the patient more susceptible to microbial pathogens. (All of the six patients reported received corticosteroids.) Among the nonspecific agents that may suppress immune responses are corticosteroids and antimetabolites. Steroids are used extensively in practice to depress immune responses. The exact mechanism of such immuno suppression is unknown. Antimetabolites that will inhibit tumors have in common the property of interfering with the synthesis of deoxyribonucleic acid and ribonucleic acid, thereby preventing cell division or new protein synthesis. Because immunological responses involve a stage of rapid cell division, these agents may inhibit such responses. Single large doses of mercaptopurine in mice can depress and delay primary antibody responses and significantly prolong the life of skin homografts if the drug is given simultaneously with, or up to three or four days after, the antigenic stimulus.

Treatment of mucormycosis has included control of predisposing factors, such as diabetes, restriction of the use of medications that inhibit immune responses or severely alter normal flora, and a variety of chemotherapeutic agents including iodides, sodium propionate, nystatin, trypsin crystallized, and mixtures of streptomycin, dihydrostreptomycin, and penicillin. As a result of animal protection and sensitivity studies conducted with

clinical isolates of the organisms, it is apparent that parenterally administered amphotericin B is of value in the treatment of mucormycosis. A limited number of patients with diabetes and mucormycosis have recovered from this complication on treatment with amphotericin B.

(The omitted figures and references may be seen in the original article.)

THE ROLE OF TEMPERATURE IN TROPICAL IMMERSION FOOT SYNDROME

*David Taplin, Nardo Zaias MD, and Harvey Blank MD,
JAMA 202(6):546-549, November 6, 1967.*

Eleven volunteers wore a noninsulated boot on one foot and an insulated rubber boot filled with water on the other foot during 72 hours of immersion in swamps. Both feet were continuously wet, but the temperature of one foot of each man was approximately 20 F (11.2 C) higher than the other throughout the study. Results indicated that symptomatic tropical immersion foot can be produced without any element due to cold injury or heat loss, and that symptoms occurred more rapidly at the higher temperature.

Prolonged immersion of the feet in cold water invariably produces injury to the tissues, the severity of which is dependent on the temperature and time of immersion, the vascular competence of the lower limbs, degree of mobility, and metabolic state of the exposed individual. The disastrous effects of such injuries in ground warfare were demonstrated in full among Allied troops in the trenches during World War I, and again among the American forces in World War II. Victims often required weeks or months of hospitalization. These injuries, sustained without freezing and their military significance have been well described by Whayne and DeBakey. Not until the American landings in Leyte in 1944, was it realized that a similar, less destructive, but nevertheless disabling injury could be caused by immersion in relatively warm water, such as encountered in tropical com-

bat. World War II ended before effective measures could be developed for the prevention of these casualties. The syndrome is characterized by severe wrinkling and maceration of the soles of the feet, accompanied by a marked lowering of the threshold to pain, so that the normal pressures exerted by walking become unbearable. Although disabling at the time of occurrence, the symptoms subside rapidly once the subject is removed from the environment. Most patients can return to duty within a week.

Once again the problem has assumed importance due to the occurrence of disabling, wet foot injuries among US forces engaged in operations in flooded terrain in South Vietnam. A preventive measure was recently devised by Taplin and Zaias in the form of a silicone grease applied to the feet. This study was confirmed on a larger scale by Buckels et al. It was not clear from these studies whether the silicone grease was effective because of its waterproofing properties or thermal insulating effects, or a combination of both. The upper level of cold, wet injury has never been accurately determined. It has been shown that immersion to the neck in water of 75 F (23.9 C) produces profound effects on the human body which cannot be offset by the normal thermoregulatory mechanisms. It might be assumed that a similar effect occurs in the lower extremities, producing a continuous heat loss which could play a role in the etiology of tropical immersion foot. Such was the assumption which prompted this study. The purpose of the two types of boots used in the

From the Department of Dermatology, University of Miami (Fla.) Medical School.
Reprint requests to 1600 NW Tenth Ave., Miami, Fla. 33136 (Mr. Taplin).

study was to keep one foot of each volunteer warm and wet, and the other foot wet and exposed to ambient temperatures. The subjects were not told which boot was expected to be superior, and subjective evaluation of results was recorded before examination of the feet by the investigators.

Materials and Methods

Eleven white, male university students aged 19 to 22 were issued regulation army socks, a standard tropical jungle boot for one foot, and a double-walled, insulated, thermal rubber boot for the other foot. The tropical jungle boot allowed free flow of external water in and out of the boot, through two small grilles situated in the inner aspect of the boot just above the sole. The rubber boot was completely occlusive to environmental water, except for a small amount which at times slopped over the tops in deep water.

The volunteers were taken to a wet area of the Everglades, Fla., where, for a period of 72 hours, the feet were kept constantly wet; the rubber-booted foot by filling with swamp water, and the jungle-booted foot by intermittent and occasionally sustained immersion in the swamps.

Physical activity was fairly strenuous, consisting of day and night patrols over wet and dry terrain. Continuous immersion in swamp water lasted approximately 6 hr/day. Between patrols, all volunteers kept their feet wet by dunking them in 5-gal containers of swamp water. When sleep was permitted, the men slept in tents on army cots. During the first night, the jungle-booted feet were prevented from drying out by placing them in plastic garbage bags taped at the top. During the second and third nights, the jungle boots were left exposed. Boots and socks were not removed, except to apply or remove skin-surface-temperature probes.

Static tests on the thermal efficiency of the boots were conducted on a subject at rest in an air-conditioned room at 75 F. The boots were placed in containers holding equal volumes of water sufficient to cover the boots.

Skin surface temperatures were recorded by means of matched calibrated surface probes connected to a battery-operated thermometer. All probes were taped to the midline of the sole of the foot at the level of the tarsometatarsal articulation.

Two investigators monitored the volunteers continuously, exactly duplicating the daytime water immersion experience, but removing their own boots and socks at night. Periodic checks were

made throughout the night to ensure that footwear was not removed.

Results

Static tests showed that the foot in the rubber boot regained normal skin temperature of about 92 F (33.3 C) within 80 minutes after the boot was filled with water at 66 F (18.9 C) even when the boot was immersed in water at 66 F.

The tropical jungle boot did not protect the foot against external water temperature, and there was a progressive drop of skin temperature to approximately 74 F (23.3 C) over the same period at rest.

In the field studies, hourly skin temperature readings on three subjects for periods up to 48 hours revealed a similar pattern (Table 1). As expected, the thermal-booted foot was consistently higher in temperature than the jungle-booted foot. Once the water contained in the thermal boot became warm (always within one hour), the foot remained warm regardless of the environmental water or air temperature.

In the jungle boot, the plantar skin temperature was subject to environmental influences. During the day, particularly while the subject was exercising in the sun, the foot was able to partially offset the effects of immersion in water, and maintained a temperature of approximately 10 F (5.6 C) above the ambient water temperature.

Radiant solar heating of the total body surface appeared to have an effect, since a rapid drop in plantar skin temperature was noted after sundown, even before ambient water temperature dropped. The temperature of the foot in the jungle boot remained below 70 F (21.1 C) throughout the night. Environmental and skin temperatures are shown in Table 1.

Seventy-two hours after the beginning of the experiment, the subjects were questioned individually before removal of the footwear and examination of the feet. Nine of the 11 subjects reported that the warm, rubber thermal boot had produced more severe symptoms than the jungle boot (Table 2). One subject could not evaluate any difference between the boots due to painful blisters on both

TABLE 1.—Field Temperature Readings of Skin and Water During Day and Night

	Day	Night
Average skin temperature in rubber boot	96 F (35.6 C)	90 F (32.2 C)
Average skin temperature in jungle boot	77 F (25 C)	<70 F (21.1 C)
Average environmental water temperature	73 F (22.8 C)	<70 F (21.1 C)

feet which prevented walking. One man had no disability on either foot, and felt he could continue indefinitely. As in our previous study, this man had thin soles.

On examination, in every case there was more maceration, blanching, and wrinkling of the skin of the sole in the rubber boot. In no case was the condition of the foot in the colder jungle boot worse than that in the warmer rubber boot. After the study, when the men returned to normal university life, some pain and tenderness continued for 24 hours in the affected individuals, accompanied in most cases by itching and burning. Three men reported some swelling and erythema which subsided within three days. One week after the study, all symptoms had disappeared, but two men thought that their feet were sweating more than usual.

Comment

Tropical immersion foot syndrome is a disabling condition produced by prolonged immersion of the feet in relatively warm water for periods exceeding 48 hours. It has in the past been confused with trench foot and immersion foot, which are associated with some degree of cold-caused injury. The dividing line between the two conditions remains in doubt, but the results reported here show that a disabling condition can be produced simply by continued warm water immersion, without the presence of injury caused by cold, or heat loss from the feet. In no case in this study was there evidence of real disability in the foot which wore the jungle boot, even though the temperature in this boot was below 70 F (21 C) during the night. A previous study showed that disability could also be produced in the foot which wore the jungle boot within 72 hours, but volunteers in that study were almost continuously in swamps. In the present study, the feet were totally immersed in swamps only six hours in 24. There appears to be a difference between wet socks and boots and total immersion in water with regard to waterlogging of the soles of the feet. The two investigators who removed their socks and boots every night suffered no maceration or disability. It is therefore apparent that this form of injury can be prevented if men on patrol in wet terrain can remove their footwear at night. This is in accordance with the British experience in Malaysia, where each man was re-

TABLE 2.—Results of 72 Hours' Immersion in 11 Volunteers

	No. of Occurrences
Warm foot more macerated	11
Warm foot more painful	9
Both feet painful	1
Both feet comfortable	1

quired by regulation to remove his footwear at night and put on a pair of canvas sneakers.

The biological mechanisms producing the painful symptoms are not understood. It is possible that it is simply caused by the continuous multiple pressure points produced by the rigid convolutions of the macerated sole. The characteristic symptoms of pain, described by the volunteers as "deep," "bony aches," and "burning" were precisely the same as those produced in subjects of previous experiments with boots having no thermal insulation, but the concept of minimal cold injury cannot be valid in the current study. It is also unlikely that the direct effect of water on the viable epidermal cells is responsible, since one would expect the man with a thin stratum corneum to become the first casualty. In fact, this type of individual escapes painful sequelae.

Conclusions

Tropical immersion foot syndrome (tropical jungle foot, warm water immersion foot, paddy foot, swamp foot) can be produced by prolonged immersion in warm water without any element of injury due to cold. The results may be temporarily disabling, an important consideration in military operations. It appears to be preventable by allowing the feet to dry out overnight, or greatly minimized by protecting the feet from water with the use of silicone grease.

In situations where footwear cannot be removed at night, the best protection at the moment would appear to be silicone grease applied to the feet. Efforts to prevent the tropical immersion foot syndrome by methods previously recommended for immersion foot, namely, by thermal insulation, will almost certainly fail and may worsen the situation.

This study was supported in part by contract DA-49-193-MD-2236 from the Office of the Surgeon General, Department of the Army, under the sponsorship of the Commission on Cutaneous Diseases of the Armed Forces Epidemiology Board, and by the Dermatology Foundation of Miami.

The volunteers who participated in this study were from "A" Company, University of Miami ROTC. Valuable logistical support was rendered by the Dade County Chapter of the American Red Cross.

MALARIA

POTENTIAL IMPORTANCE TO CIVILIAN PHYSICIANS

*CPT Blake E. Waterhouse MC USA, and MAJ Roger D. Rigenbach MC USA,
JAMA 202(8):123-125, Nov 20, 1967.*

Malaria develops in a significant number of servicemen who return from Vietnam. One hundred consecutive cases seen in a three-month period at Darnall Army Hospital, Fort Hood, Tex., are reported. One fourth to one half of such patients experience symptoms while on leave in a civilian community. Illness in the typical patient has its onset within two months following the return from Vietnam and is characterized by the sudden development of fever, chills, headaches, and myalgia. Splenomegaly, when present, is usually of only moderate degree and may represent the only significant abnormality on physical examination. Diagnosis is made by demonstrating the malaria parasites in peripheral blood smears. The most common species in this study was *Plasmodium vivax* (83 percent). Correct treatment depends on species identification and is effective. The incidence of malaria in Vietnam returnees represents a significant medical problem for civilian physicians.

Malaria is a significant diagnostic and therapeutic problem in the United States today. Although malaria has always been of major worldwide concern, only recently has it also become important for physicians in this country to be familiar with the various diagnostic and therapeutic aspects of this disease. Since the commitment of combat troops to the Central Highlands area of South Vietnam in late 1965, a marked increase in the incidence of malaria in US troops has occurred. In 1966, there were 7,832 cases of malaria reported in US military personnel serving in Vietnam.

The potential importance and scope of the malaria problem becomes evident when consideration is given to the increasing number of US military personnel who have served in Vietnam, returned to the United States, and are now scattered throughout the country. In 1966 alone, there were over 250,000 men rotated back from Vietnam. The majority of these men were rapidly transported back to the United States via jet aircraft and then took a four- to six-weeks' leave to visit

their families. Many others were permanently discharged from the armed services soon after their return from Vietnam. Consequently, a significant number of the men will experience the initial symptoms of an acute malaria episode while in a civilian community. In addition, *Anopheles* mosquitoes responsible for the transmission of malaria are present in many parts of the United States. Therefore, secondary cases of malaria in the nonmilitary population are also a distinct possibility.

These cases of malaria occurring in a civilian setting have frequently presented diagnostic and therapeutic problems. Previous articles have delineated the challenging aspects of malaria as seen by the military physician in Vietnam, but few have dealt with the problem as it might present to the civilian physician in this country. This preliminary report is submitted in an attempt to familiarize the practicing physician with the clinical picture, appropriate therapy, and adequate follow-up of such cases.

Methods

This study is based on information obtained from a clinical evaluation of 100 consecutive patients with malaria admitted to Darnall Army Hospital since Feb 1, 1967. Darnall is a 392-bed facility providing the hospital capability for approximately 30,000 US Army troops and their dependents stationed at Fort Hood, Tex.

All patients in this study were active-duty male military personnel who had returned from Vietnam in recent months. These patients considered their health to be essentially normal upon their arrival in the United States, and most of them had taken the usual four- to six-weeks' leave.

The information for this study was derived from a combination of sources. These included a careful clinical history and physical examination, a review of the patient's army health record, and the completion by each patient of an especially prepared standardized questionnaire. All the patients were examined, treated, and followed through by the authors. Diagnosis was established through the use of

From the Department of Medicine, Darnall Army Hospital, Fort Hood, Tex.

Reprint requests to Department of Medicine, Darnall Army Hospital, Fort Hood, Tex 76544 (Dr. Waterhouse).

both thin and thick blood smears obtained from capillary blood.

The routine procedure following hospital discharge was to obtain peripheral blood smears for malaria weekly for one month and again at the end of two months. No follow-up treatment is necessary. The patients were examined by the authors at four and eight weeks following discharge.

Results

Incidence.—Between Feb 1 and April 30, 1967, there were 100 patients with malaria admitted to the Darnall Army Hospital. During a comparable period of time, approximately 2,500 male military personnel returned from Vietnam and were subsequently stationed at Fort Hood. In our Fort Hood population, the gross incidence of malaria in the soldiers who have returned from Vietnam within this three-month period is approximately 4 percent.

Sixty percent of our patients had experienced one or more documented episodes of malaria while stationed in Vietnam. Eighty-nine percent of these episodes, which occurred while in Vietnam, were caused by *P falciparum*.

Malaria Species.—In the present series, 83 percent of the illnesses were caused by *P vivax*, 8 percent by *P falciparum*, 2 percent by *P malariae*, and 7 percent were mixed (*P vivax* and *P falciparum*) infections.

Asymptomatic Interval.—The interval of time between the departure from Vietnam and the onset of the clinical symptoms of malaria was calculated for each patient. The results are as shown in the Table. During the first month, in 29 percent of the patients the onset of clinical symptoms developed. Forty-seven percent occurred during the second month and 20 percent in the third month. In only 4 percent of the patients was this asymptomatic interval greater than three months. The latter figure may be biased by the relatively short period of time which has elapsed since the majority of Vietnam returnees arrived at Fort Hood.

Usual Clinical Manifestations.—The most common symptom complex in our series consisted of the acute onset of chills, fever, frontal headache, generalized myalgia, and low back pain. Less frequently occurring symptoms were abdominal pain, nausea and vomiting, cough, pain in the joints, and confusion.

The typical physical findings included an acutely ill patient with an initial temperature of 103 to 104 F (39.4 to 40.0 C). Minimal to moderate sple-

Time Interval From Leaving Vietnam Until Onset of Symptoms

Weeks	No. of Patients	No. of Patients per Month	Accumulative % of Total
1	2	29	29
2	10		
3	4		
4	13		
5	2	47	76
6	15		
7	3		
8	27		
9-12	20	20	96
13-16	1	1	97
17-20	3	3	100

nomegaly and splenic tenderness were frequently present. Hepatic enlargement and tenderness occurred less frequently. Occasional herpes simplex labialis and conjunctivitis were noted, while only very infrequently did gross icterus, hypotension, and urticarial rash occur.

The most significant and only diagnostic laboratory study was the malaria blood smear which was positive in all of our patients. Findings which are suggestive, but not diagnostic, include an anemia, leukopenia, hyperbilirubinemia (predominantly indirect bilirubin), and moderate serum glutamic oxaloacetic transaminase, serum glutamic pyruvic transaminase, and alkaline phosphatase elevations.

Treatment.—The treatment of choice for *P vivax* malaria (as well as *P malariae*) is 2.5 gm of chloroquine phosphate administered orally over a three-day period and primaquine phosphate 15 mg/day orally for 14 days. (The usual dosage schedule of chloroquine phosphate is 1.0 gm, followed in six hours with 0.5 gm, and followed on each of the two successive days with 0.5 gm.) If, with these two drugs, the patient is still febrile and symptomatic after three days of treatment, a diagnosis of *P vivax* malaria would be extremely unlikely. If, however, the fever and symptoms clear rapidly with the initial chloroquine and primaquine therapy, yet recur in a few days, additional malaria blood smears should be obtained. Such a clinical pattern suggests that the patient has a mixed infection, with not only the initially diagnosed and treated *P vivax*, but also with *P falciparum*. While this treatment program usually results in the radical cure of *P vivax*, it is only suppressive for *P falciparum*. Consequently, if *P falciparum* is demonstrated in the peripheral blood, additional curative treatment should be instituted.

The successful treatment of *P falciparum* malaria has been much more difficult and has been discussed frequently in the literature. All *P falciparum* in-

fections in individuals who have been stationed in Southeast Asia should be considered chloroquine resistant and should be treated accordingly. Of those drugs currently available to civilian physicians, one combination which has relatively few serious side effects and which was used successfully in our series was the concomitant use of the following medications administered orally: quinine sulfate, 1.0 gm three times a day for two days, then 0.65 gm three times a day for 12 days; sulfadiazine, 0.5 gm every six hours for ten days; and pyrimethamine (Daraprim), 25 mg three times a day for six days. Many other treatment programs have been suggested for *P falciparum*, and apparently none which are commercially available are ideal.

On the treatment program just outlined, there has been no known relapse of infection among patients with *P falciparum*, while there have been six patients who are known to have had one relapse of their *P vivax* infection. Such relapse infections are treated in exactly the same way as the initial infection. Since only three months have elapsed since the completion of our study, the follow-up period is relatively short, and a few additional cases of relapse may be expected.

Comment

The incidence of malaria in returnees would be expected to vary depending on such factors as the area in Vietnam in which the individuals were stationed, the type of duty they performed, and to what extent malaria-control measures were practiced by their units. The vast majority of our patients had been assigned to units in the malaria-infested Central Highlands area adjacent to Pleiku and An Khe. Most were involved in frequent night patrols and extended missions or both.

While it is well documented that approximately 90 percent of the malaria occurring in Vietnam is caused by *P falciparum*, it is of interest to note that when these same patients have episodes of malaria after returning to the United States, the predominant causal species is *P vivax*. This may re-

flect the fact that the suppressive prophylaxis used in Vietnam is very effective against *P vivax* but not against *P falciparum*. Consequently, most clinical cases of *P falciparum* malaria occur while the patient is still in Vietnam. Treatment of these patients may result in a radical cure for *P falciparum* malaria but only temporary suppression of the *P vivax*. After the patient leaves Vietnam and discontinues medication, the *P vivax* infection then becomes clinically manifest.

Each man who returns from Vietnam is authorized a four-weeks' leave, which is usually spent at home. It was during this time that more than one fourth of our patients experienced the onset of malaria symptoms. The four-weeks' leave is occasionally extended to six weeks, and by the end of the first six weeks following their return from Vietnam, almost one half of our patients had noted the onset of malaria symptoms.

The usual clinical findings have been presented. Some additional facts should be emphasized. Anyone returning from Southeast Asia who develops a febrile illness should be considered as a possible patient with malaria. Forty percent of the patients who present with malaria after returning to the United States did not have malaria while in Southeast Asia. Three fourths of the patients with malaria experience the onset of symptoms within the first two months after their return to the United States.

It becomes quite apparent then that each month a significant number of servicemen will experience the onset of acute malaria while at home on leave and under the primary care of their civilian physicians.

Generic and Trade Names of Drugs

Chloroquine phosphate—*Aralen Phosphate*.

Pyrimethamine—*Daraprim*.

(The omitted figures and references may be seen in the original article.)

MEDICAL ABSTRACTS

ACUTE HYPERPARATHYROID CRISIS

Wayne C. Bartlett MD, *Amer J Surg*
114(5): 796-799, Nov 1967.

It should be re-emphasized that early recognition of acute hyperparathyroidism is important and that once the diagnosis is made, this condition warrants emergency surgery. The diseased parathyroid tissue must be removed surgically since this is the only way of overcoming the crisis. The symptoms may be bizarre and the only definite way of making a diagnosis at this time is by determination of the serum calcium level, which is usually above 15 mg. percent, associated with rapid changes in the general condition of the patient, with varying degrees of psychic disturbances, weakness, somnolence, and coma. Early operation is essential to reduce the high mortality. It should be remembered that an earlier diagnosis of hyperparathyroidism may be made in many instances if serum calcium surveys are made, particularly in families in which previous members have had the disease.

A case of acute hyperparathyroid crisis without the signs and symptoms of chronic hyperparathyroidism is presented. This patient recovered after the removal of a large clear cell adenoma with hemorrhage and necrosis.

COMBINED RADIOTHERAPY, SURGERY AND CHEMOTHERAPY IN CARCINOMA OF THE BLADDER

Ralph J. Veenema MD, *et al., Cancer*
20(11): 1879-1885, Nov 1967.

A 5-year experience in 109 patients with cancer of the bladder treated by combination radiotherapy, surgery and chemotherapy is reviewed. This combined therapy did not improve the poor outlook for patients with invasive (stages C or D) tumors. The study reveals that, when the bladder is preserved in stage B carcinoma by partial cystectomy or endoscopic excision, postoperative radiotherapy should be added to bring the total dosage to a full therapeutic level. In large bulky stage A tumors preoperative radiotherapy seems to be distinctly valuable in reducing tumor size and clarifying the extent of pathology. It thus aids in the selection of the surgical approach to the tumors. More definitive biopsies could be done after the preoperative radiation. In such patients preoperative radiation make tech-

nically possible partial cystectomy or endoscopic resection rather than total cystectomy. In these stage A tumors, when the bladder is preserved, postoperative installations of Thio-TEPA into the bladder is used to supplement the preoperative radiotherapy.

TREATMENT OF HEPATIC INJURIES

John F. Perry, Jr. MD PhD, *et al., Surgery*
62(5): 853-861, Nov 1967.

Based on a review of a recent 10 year experience, the following considerations seem to be pertinent in treatment of liver injuries.

Most capsular tears have been present in patients who have massive extrahepatic injury. Bleeding in large quantities from such injuries has not occurred.

Minor hepatic lacerations as defined herein have not caused exsanguinating hemorrhage. They have not been associated with complications and can be repaired by sutures.

Major lacerations which do not result in devitalized liver lateral to the laceration can be repaired by suture provided no dead space is left in the depth of the hepatic wound. If liver tissue is devitalized, it must be resected and the raw edge of liver sutured so that bleeding or bile leakage does not occur.

Bursting injuries of the liver require debridement by sublobar or lobar resection with individual ligation of larger ducts and vessels and compression of the raw edge of hepatic parenchyma as tightly as possible by mattress sutures tied over pieces of omentum.

Biliary tract intubation by T tube or cholecystostomy is probably of value in preventing a rise in biliary pressure and increased risk of biliary leakage from the raw surfaces of liver following operation, but this has not been proved.

Patients with hepatic injuries die for several reasons. Associated injuries are most commonly the cause of death. Death may be attributed to the liver injury itself in the following circumstances:

1. Uncontrollable hemorrhage.

2. Treatment of an injury by repair when resection of devitalized liver tissue should have been performed. Necrosis of devitalized hepatic tissue leads to hepatic failure. Inadequately repaired

lacerations of the liver lead to intrahepatic abscesses and hemobilia.

3. Hepatic failure following repair or resection may also be due to prolonged hypotension from blood loss or due to concomitant liver disease.

STUDIES OF VENEREAL DISEASE

*LT King K. Holmes, MC USNR, et al.,
JAMA 202(6): 461-466, Nov 6, 1967.*

Treatment of gonorrhea in men with a single intramuscular dose of 2,400,000 units of procaine penicillin G, recommended by the US Public Health Service and the armed forces in 1965, continues to result in 20% to 30% treatment failures among military personnel in the Far East. In studies of confined populations aboard aircraft carriers, 63 men with gonorrhea received 2,400,000 units of procaine penicillin G with 18 (29%) treatment failures; 58 men received 2,400,000 units procaine penicillin G *plus probenecid* orally, with only one failure. Resistance to 0.06 units of penicillin per milliliter of medium was noted in 26 of 41 (63%) and 57 of 74 (77%) *Neisseria gonorrhoeae* isolates from the respective groups. Thirty men received tetracycline hydrochloride orally, with no failures. In areas where treatment of gonorrhea with large parenteral doses of penicillin G is becoming less effective, adequate therapy is possible with probenecid plus penicillin or with tetracycline.

PRINCIPLES OF CURRENT MANAGEMENT OF PRIMARY GOUT

*T's'ai-Far Yu, MD and Alexander B. Gutman,
MD PhD, Amer J Med Sci 254(6):
893-907, Dec 1967.*

In the past two decades considerable progress has been made in the management of gout, by the introduction of effective new drugs to control the hyperuricemia characteristic of the disorder and by fuller utilization of the properties of colchicine and other drugs to prevent and terminate acute attacks. The central problem now is not a paucity of therapeutic measures but rather the appropriate and discriminating use of those available to minimize the disabilities and deformities of this ancient malady, once the scourge of many illustrious personages. The objective of this review is to summarize the principles of current management; optimal response, however, depends upon individualization of treatment. For better perspective in determining when drugs should be employed and when they need not be (so as to avoid indiscriminate and unnecessary medication), and in selecting the agent most appropriate for trial in the particular patient, it is helpful to have some insight into the pathogenesis of gout and its natural course.

DENTAL SECTION

PREVENTIVE PERIODONTICS—A BLUEPRINT FOR THE PERIODONTAL HEALTH OF THE AMERICAN PUBLIC

*I. Glickman, J Periodont 38 (5):
361-367, Sept-Oct 1967.*

A very timely article which discusses the role that organized dentistry must play in educating the public in preventive periodontics. With such statistics as:

1. Periodontal disease causes more tooth loss than caries in the adult . . .
2. Tooth loss from periodontal disease becomes a significant problem beginning at age 35 . . .
3. Four out of five persons have gingivitis by the age of 15 . . . it becomes apparent that preventive periodontics must assume a role of major

importance. The methods of treatment of periodontal disease known today are more effective than for any other chronic affliction of the human body.

Neglect is mentioned as a principal cause of gingival and periodontal disease.

1. Neglect of the healthy mouth permitting disease to occur.

2. Neglect of early disease permitting destruction of tooth supporting tissues.

3. Neglect of treated mouth permitting disease to recur.

Local factors are given as the principal cause of periodontal disorders. The author continues by stating that there are no forms of gingivitis or periodontal disease in which the removal of local irritants and prevention of their recurrence does not:

- a. Reduce severity of disease
- b. Lessen rate of destructive process
- c. Extend usefulness of natural dentition

Many studies are referenced concerning the formation of plaques, calculus, the efficacy of tooth brushing, the reduction of gingivitis with effective brushing and the reduction of gingivitis by means of subgingival scaling. One reference cited was an opinion poll which revealed that only 14 percent of 1,434 adults were aware of a correlation between poor oral hygiene and periodontal disease. The control of the local environment effectively reduces the incidence of and arrests periodontal disorders.

Another approach mentioned for the prevention of periodontal disease is fortifying the periodontium against injurious local factors by local and systemic means. The greater challenge lies in the systemic approach in improving the capacity of the periodontium to cope with injurious environmental factors. The saliva could be converted into a potent preventive agent by secreting systemically administered drugs.

In addition to the prevention of periodontal disease, preventive periodontics must include the prevention of mutilation of the periodontium, and prevention of recurrence after treatment. The author continues, stating, that it is simpler to treat a mild gingivitis than a severe gingivitis, to eliminate shallow pockets rather than deep pockets and to prevent bone destruction and osseous defects rather than correcting them.

Another area of concern for dentistry, is the education of the public in preventive periodontics. People are not interested in helping themselves. This is self-evident when statistics show that less than 50 percent visit a dentist regularly. The author concludes with the following statements to be used as a "blueprint" for the periodontal health of the American public:

1. Establishment of a national program of periodontal disease detection centers—a multi-centric operation to include cities and towns.
2. Each center to incorporate a screening procedure with results given both to the patient and to the patient's dentist.
3. Teach patient proper oral hygiene.
4. Findings from centers be correlated nation-

ally to determine periodontal needs, etiology of disease, etc.

5. Emphasis in teaching periodontics in dental schools be shifted from salvaging dentitions to that of preventing periodontal disease.

6. Conduct psychological warfare on attitude of American public to motivate them to take advantage of available methods of preserving oral health. To be done utilizing mass communication media of press, radio, T.V., etc.

(Abstracted by: CAPT P. C. Alexander, DC USN.)

HOT TONGUE SYNDROME

*George E. Sharp MD, Pasadena, Calif.,
Arch Otolaryng 85: 90-92, Jan 1967.*

The Hot Tongue is a clinical entity characterized by complaints of pain, rawness, and soreness of the tongue and, often, other oral surfaces. The most frequently observed oral clinical sign associated with this syndrome is either an atrophic or erythematous appearance of the tongue and mucous membranes. Evidence of glossitis and enlargement of the tongue or geographic characteristics are frequent. A generalized pale color of the mucous membranes is typical. Secondary complaints include dry mouth or throat, constipation, heartburn, nausea, vomiting, and symptoms of colitis in this order of frequency. The symptoms are usually cyclic.

In the author's vast experience, vitamin supplementation has rarely been effective in relieving these symptoms. He concluded that the hot tongue is a symptom more often associated with other alimentary tract complaints. These abnormal signs are particularly intensified in the achlorhydric group.

Successful treatment consisted of:

1. Eliminating all possible local irritating factors.
2. Nonachlorhydric patients were placed on a special liver fraction supplement.
3. A combination of the liver fraction and hydrochloric acid tablets were given to the achlorhydric group.

(Abstracted by: CDR W. K. Bottomley DC USN.)

PERSONNEL AND PROFESSIONAL NOTES

DENTAL CLASSIFICATIONS IN THE SUBMARINE FORCE

A previous article in 50(12): 19 compared the dental classification of Recruits upon induction and upon completion of Recruit Training. Of interest is the accomplishments of the Naval Dental Corps in upgrading the dental classification of naval personnel during tours of service. In selecting one group of individuals, although unique, the Dental

Corps may well be proud of fulfilling its mission to the Submarine Service. A recent examination revealed crews of the below listed submarines to be in dental classifications as follows:

	Class I	Class II	Class III
USS G. BANCROFT	127 (91%)	11 (9%)	0 (0%)
USS G. W. CARVER	119 (89%)	14 (10%)	1 (-1%)
USS P. HENRY	121 (88%)	15 (11%)	2 (1%)
USS A. LINCOLN	131 (94%)	15 (5%)	4 (1%)
USS G. MARSHALL	127 (94%)	6 (5%)	2 (1%)
USS J. K. POLK	123 (91%)	11 (8%)	1 (-1%)
USS T. ROOSEVELT	126 (92%)	10 (7%)	1 (-1%)
USS G. WASHINGTON	125 (92%)	12 (7%)	2 (1%)

NURSE CORPS SECTION

NURSING CARE OF THE CHILD WITH CANCER

At the Pediatric Nursing Conference held recently for Nurse Corps officers at the National Naval Medical Center, Bethesda, Maryland the nursing care of the child with cancer was discussed by LTJG June McCalla, NC USNR. LTJG McCalla is a member of the inactive reserve and is Head, Cancer Nursing Service, National Institute of Health, Bethesda, Maryland. Some of LTJG McCalla's comments are presented in the following text.

The pediatric unit is one of six nursing units assigned to the National Cancer Institute by the administrative staff of the Clinical Center. While there is no attempt to control the ratio of the bed assignments, usually the majority of the patients on the unit have acute leukemia; additional children may have a diagnosis of Wilm's tumor, lymphosarcoma or other malignancies. The age range of the patients fluctuates from infancy to sixteen years with the majority of the patients being between 4 and 8 years of age. Since most of the comments which are made will also apply to the other malignancies I shall focus on the nursing care of children with acute leukemia.

Freirich defines acute leukemia as a neoplastic disease of the blood in which the predominant leukemic cell is an immature form of the white cell closely resembling the normal blast or stem cell. Acute Lymphocytic Leukemia is a disease of young children. Acute Myelogenous Leukemia is rare in children. In the ages of 0-10 years, 95% of the children have at least one remission. Acute Lym-

phocytic Leukemia also occurs in adults, but adults do not respond as well as children.

Since the introduction of chemotherapy, the length of the patient's life after diagnosis has been prolonged. For children, acute leukemia has become a major form of chronic illness. The adult remains acutely ill and does not have the long periods of freedom from illness which the child has when he is in remission. All of the chemotherapeutic agents are less effective in adult leukemia.

When the disease is active, the nursing care of the patient is most challenging. The leukemia cells invade all of the body processes. The red blood cells are destroyed; therefore the patient is anemic. The platelets are destroyed; therefore, the patient has a tendency to bleed. One of the most helpful guides to the nurse to assist her in becoming aware of a low platelet count is the skin condition of the patient since it may have petechiae and ecchymotic areas. When hemorrhage occurs, it may be in the form of epistaxis which must be controlled by pressure. The patient may have bleeding gums. A menstruating patient may have severe menorrhagia. There may be hemorrhage from the gastrointestinal tract. The greatest danger to the patient, however, lies in hemorrhage into the central nervous system. The nursing responsibilities for a patient who is hemorrhaging are obvious. Alertness, both to changes in the quantity of bleeding and to changes in the patient's vital signs or to changes in the patient's general condition, is mandatory.

At the Clinical Center, we see relatively little

hemorrhage due to the platelet replacement program. On the pediatric unit, I rarely see more than an occasional epistaxis. The adult patients, however, still have various types of hemorrhage because of the large quantities of platelet rich plasma which would be necessary to completely eradicate their bleeding. The necessary volume is based on body surface area. Supplementary transfusions of either fresh whole blood or packed red cells are also given to combat hemorrhage and anemia. The nursing care for patients who are receiving transfusions of platelet rich plasma is essentially the same as that which is required for transfusions of whole blood. The patient's temperature may become elevated in both instances; the blood pressure, the pulse and the respiratory rate should remain in ratio to the temperature. A sudden change in the blood pressure, or a rapid increase in pulse and/or respiration usually indicates an adverse reaction to the blood product. The nurse then decreases the rate of flow while she notifies the doctor.

Another aspect of rampant leukemic disease is less familiar to nurses than is hemorrhage. As was stated previously, leukemic cells invade all of the body processes. In the kidney, the leukemic invasion results in the formation of uric acid crystals. These crystals cause an elevated blood uric acid level and either milky white or bloody urine. If the crystals are not removed from the kidney, permanent damage may result. The treatment is usually flushing the kidney by means of huge quantities of fluids by either oral or intravenous route. A three year old child may require 3 to 4000 ml. of fluids; an adult may require 6 to 7000 ml. Nursing plays an important role here as the observation of a patient receiving this quantity of fluid intravenously is mandatory. In addition, an alkalizing agent such as sodium bicarbonate may be added to the intravenous if the uric acid level is extremely high. When this is the case, the nurse is asked to follow each voiding with a test of the urinary Ph by the use of nitrazine paper. It then becomes important that she notify the doctor as the urine approaches neutrality. If the patient is well enough to drink these huge quantities of fluids, it requires careful explanations and much encouragement from the nurse in order for the patient to fulfill this high oral requirement.

Once chemotherapy has been instituted, the nursing care changes since all of the chemotherapeutic agents produce some toxic side effects. Freirich states that for remission induction there are five

classes of agents of established effectiveness: the folic acid antagonists of which methotrexate is most commonly used; the purine analogs, such as 6-mercaptopurine; the adrenal-corticosteroids, such as prednisone; the alkaloid, vincristine; and the alkylating agent, cytoxan.

When a patient is receiving prednisone, he retains body fluids and thus has an increase in his body weight. Even the little children notice this change in themselves, and they too resent anyone who calls them "fat." The teenage patients, of course, are very sensitive to this weight increase and they will ask the doctor for a reducing diet. Prednisone is the one agent which actually increases the patient's appetite. The mothers of our pediatric patients become quite excited when their formerly anorectic child begins to eat. Some doctors restrict the salt intake during this period. Our doctors do not unless hypertension, a major side effect, develops. When a patient is receiving prednisone, his blood pressure is usually taken at least four times a day, and if hypertension is noted, the dosage is tapered. Some patients have had seizures while on this therapy. The patient's body electrolytes may become imbalanced. Potassium must be added in large quantities; since most of the patients have bleeding gums or sore mouths and would be unable to drink quantities of orange or tomato juice, potassium tablets are usually given. Perhaps the most disturbing side effects to the nursing staff and the patient's family are the personality changes which result from this drug. If the child has had any emotional problems before this time, they become even more exaggerated. There may be violent temper tantrums, extreme irritability, or periods of extreme babyish or sullen behavior. Euphoria may also be a side effect; this is embarrassing for the teenage patient or the adult.

Vincristine, which is such an effective agent in childhood leukemia, also has side effects. All of the patients receiving this drug have some degree of alopecia. A few of the patients lose only small quantities of hair while others become completely bald. The children who are old enough to understand, their parents, and all of the adult patients are told when the treatment is started that the patient will lose his hair. The hair loss may be gradual or suddenly huge quantities of hair will fall out. Fortunately today wigs are worn by many women and toupees are generally accepted for men; our patients are offered wigs or toupees, and the female patients usually accept them. Constipation and obstipation are also side effects of this

drug. A bulk-forming cathartic is given daily while the patient is receiving vincristine. If one day passes without a bowel movement, a rectal suppository or enema is given. Ptosis of the eye lids, muscular weakness of the hands and feet are also side effects. The hand weakness is noticeable when the child attempts to manipulate small objects; the foot weakness causes a flopping gait. Some patients who have had emotional difficulties previously may withdraw when they are receiving this drug.

6-Mercaptopurine which is such an effective drug produces severe bone marrow depression. The bone marrow is not able to function in a normal manner; therefore the patient's white blood count is depressed so that leukopenia is present. Many of the patients have white blood counts of only 600-400 or 300; so they are very prone to infection. The drug also causes nausea and vomiting; therefore the patient does not receive an adequate oral intake. The nurse must be alert to any signs of infection such as an infected finger from a "finger stick"; an ingrown toe nail which might become infected, or a red area at the site of an injection. Any of these might lead to an overwhelming septicemia. In addition, the nurse should report every temperature elevation to the patient's doctor as promptly as possible. Usually cultures are taken from the throat, nose, stool, and urine specimens as well as a blood culture whenever there is a temperature elevation. If there is an obvious site of infection, this is cultured as well. Our patients are not placed in reverse isolation to prevent infection, as this has been found only partially effective; instead good body hygiene, encouragement of adequate amounts of oral fluids and calories, and the prompt treatment of all infections is the procedure.

Methotrexate, another very effective drug also produces bone marrow depression so that the danger of infection remains an overwhelming one. In addition, it causes severe stomatitis so that the mouth may become a breeding place for both fungus and bacteria. Cleansing the mouth must be gently performed with toothettes, cotton applicators and mouth washes. Since an adequate oral intake is so necessary, topical viscous xylocaine is applied to the mouth lesions twenty minutes before all meals and nourishments. The patient is then able to eat and drink almost everything but citrus products. Ulcerations of the gastrointestinal tract may also result from methotrexate so that the patient may have severe diarrhea or vomiting. The danger

of dehydration and overwhelming infection may then become very severe. Maintenance of oral fluids, reporting of all temperature elevations, careful recording of the quality and quantity of all stools are important nursing functions when this drug is given. Methotrexate also causes alopecia.

Since the effects of the five remission induction agents on the leukemic process are independent, the combination of these drugs has been most effective in producing and maintaining remissions. Meningeal leukemia was not known a few years ago because chemotherapy was not as effective as it is now. With the drugs available today, patients are living longer with their disease. Today nurses need to know that there is such a thing as meningeal leukemia, and that leukemia cells may be present in the cerebrospinal fluid when the bone marrow is in remission. It is especially important for the public health nurses to know this because the patient is usually at home when he is in remission, and if he is a child, he will be attending school. Nurses need to know that the first symptom of meningeal leukemia is headache. The headache is caused by the increased pressure in the cerebrospinal fluid. If the patient is not treated, the pressure will continue to increase and seizures, blindness, and cranial nerve palsies may result. Usually the nurse is the first person to notice the patient's headache. He may ask the nurse to close the blinds because he has a headache and the light is hurting his eyes. Thus the nurse knows that he has photophobia as well. It is important for the nurse to report these findings as soon as possible so that intrathecal medications may be given.

The nursing care of patients with acute leukemia is not all physical. The emotional support of the patient and his family is as important as the physical support. It is essential that the nurse understand the behavior of both the child and his parents. At the Clinical Center the emphasis is one of encouraging the patient to lead as normal a life as is possible. Activity is encouraged. Our patients dress in their own clothes every morning, and they undress into pajamas at night. As little time as possible is spent in bed. Patients who are receiving intravenous therapy walk about the halls pushing their intravenous poles ahead of them or ride about the Clinical Center in wheelchairs to which their intravenous therapy bottles are attached. The children attend Occupational Therapy programs on a daily basis; they attend the Patient Activity programs of movies, sports, table games, concerts, and variety

shows. Those who are able to do so participate in the sight-seeing trips. The children continue to attend school while in the hospital. The children are quite shocked to discover that even continuous intravenous therapy does not excuse one from school! The senior pediatrician and the social worker work very closely with the medical and nursing staffs as well as with the parents in an attempt to try to prevent emotional problems from developing by encouraging everyone to treat the child as normally as possible.

As was discussed previously, hope for longer remissions is the goal of the medical staff, the nursing staff, the social worker, all of the paramedical services, and the parents; therefore, hope is the unifying force of the pediatric unit.

Friedman states that the element of hope as it refers to a favorable alteration of the expected sequence of events is of general clinical importance and is universally emphasized by the parents. He notes that hope, unlike massive denial, does not appear to interfere with effective behavior and is entirely compatible with an intellectual ac-

ceptance of reality. The persistence of hope for a more favorable outcome does not require the need to deny that the child's prognosis is of clinical significance. Hope actually helps the parents accept bad news but becomes more limiting in that instead of hoping for the development of a curative drug, the hope might be only for one further remission. Parents then no longer make long-range plans, but live more on a day-to-day basis.

By the fourth month of the child's illness, the parent is in the process of resigning himself to the inevitable outcome. When the death of a child occurs soon after the diagnosis, and the parent has not had the opportunity to proceed through the various phases of shock, denial, anger and hope (which is called anticipatory grieving), he will have a more prolonged and distressing reaction after the child has died. The desirable resolution of the grief process is for the parents to overcome much of their disappointment and to accept reality. Hope enables the parent to develop new and attainable goals for the child which are within his potential, and it is within this atmosphere of hope that the pediatric unit functions.

RESEARCH SECTION

DIRECTOR OF RESEARCH DIVISION, BUMED, RETIRES

Captain Joseph P. Pollard, MC USN, retired from active duty on 1 January 1968 after more than 26 years of active service. At the time of his retirement he was Director, Research Division, Bureau of Medicine and Surgery, Navy Department, Washington, D.C.

After earning his B.S. at the College of William and Mary in 1935, he received his M.D. from the University of Virginia in 1939. During his Naval career, Doctor Pollard served as Flight Surgeon for aircraft squadrons on staffs in both the Atlantic and Pacific fleets and in the aircraft carriers USS HORNET, USS YORKTOWN, and USS CORAL SEA. Other positions he has held include that of a Navy staff member, Research and Development Board, Office of the Secretary of Defense; Executive Officer and Head of Aviation Medical Research, Naval Medical Research Institute, Bethesda, Maryland; Assistant to the Chief of Naval Research for

Medical Sciences, Office of Naval Research; Program Manager for Aerospace Medical Research, BuMed; and Assistant Chief of BuMed for Research and Military Medical Specialties. In his new civilian position as Director, Biological and Medical Sciences Division, Office of Naval Research, Doctor Pollard is responsible for research in his area of interest.

Among his professional accomplishments are: Diplomate of the American Board of Preventive Medicine in Aviation Medicine; Fellow of the American College of Preventive Medicine; Member of the International Academy of Aviation and Space Medicine; Member of the Washington Academy of Medicine; and Fellow of the Aerospace Medical Association. Active in the affairs of the Association, Doctor Pollard is currently a member of the Executive Committee and the Executive Council.

Vice Admiral Robert B. Brown, Surgeon General of the Navy presented Doctor Pollard with a Certificate of Merit which cited several accomplish-

ments of his Naval career: "Among Captain Polard's many achievements, the most recent has been his role in the establishment of a progressive and effective Navy medical research and development program. . . His efforts included the integration and coordination of the Office of Naval Research contract program in the medical sciences with the Navy's in-house program sponsored and managed by the Bureau of Medicine and Surgery. He established a project officer system for management of the research programs. Under his leadership and with this more effective organization, the

Medical Department research and development programs expanded in scope from basic research to include projects in exploratory and advanced development . . . Success . . . has been reflected in the rapid response of the research and development programs to operational problems in South-east Asia, manned space and underwater programs, and advances in the control of infectious diseases in the military environment."

". . . His scientific excellence and presence on . . . committees and boards has served to maintain and enhance the reputation of Navy Medicine. . . ."

PREVENTIVE MEDICINE SECTION

TRIALS OF FIVE ANTIBACTERIAL CREAMS IN THE CONTROL OF NASAL CARRIAGE OF *STAPHYLOCOCCUS AUREUS*

J. D. Williams, C. A. Waltho, G. A. J. Ayliffe, and E. J. L. Lowbury,
Lancet II(7512): 390-392, Aug 19, 1967.

Staphylococcus aureus was removed from the nares of 15 out of 23 persistent carriers during one week's local use of a cream containing 0.3% gentamicin, and from a similar or smaller proportion of carriers who used creams containing 0.5% neomycin and 0.1% chlorhexidine (9/12), 0.5% chlorhexidine (5/12), 0.75% halquinol (3/12), or 0.1% vancomycin (5/12); 5 out of 69 persistent carriers in the control series lost *Staph. aureus* from the nares during the use of an inactive cream. When removal and reduction in amount of *Staph. aureus* in nares during treatment were grouped together, gentamicin cream had the largest effect (22/23); vancomycin (10/12) and neomycin plus chlorhexidine (9/12) were next in order, with slightly smaller effects; but chlorhexidine (7/12) and halquinol (8/12) also had a significantly larger effect in reducing or removing staphylococci than did the inactive control cream (7/69).

The removal of virulent *Staphylococcus aureus* from the nares of carriers may be indicated in the treatment of recurrent staphylococcal sepsis, or as a measure in the control of hospital infection; prophylaxis against nasal colonization may also be indicated. Methicillin has been found effective for these purposes to minimize the selection of resistant variants, however, agents which are not used for systemic treatment of staphylococcal infection

are generally preferred for local application; of these, neomycin and the related antibiotic framycetin have been found the most effective in nasal disinfection, and they are commonly applied in combination with chlorhexidine, bacitracin, or other antimicrobial agents.

Since the emergence of neomycin-resistant staphylococci, sometimes associated with bacitracin resistance, there has been a need for alternative agents as effective as neomycin in removing staphylococci from the nose.

Participants in the main series of trials were nurses at a general hospital. A confirmatory trial with gentamicin was made on nurses and laboratory workers at another hospital.

Swabs were taken from the anterior nares of all volunteers on 3 days (usually on alternate days) of one week.

The following agents in an emulsion cream base were tested: 0.5% neomycin sulphate with 0.1% chlorhexidine ('Naseptin'); 0.5% chlorhexidine ('Hibitane') gluconate; 0.75% halquinol ('Quixalin'); 1% vancomycin ('Vancocin'); and 0.3% gentamicin sulphate ('Cidomycin'). A limited pilot study was also made with 1% noxythiolin gel ('Noxyflex'). Creams with no antibacterial agent were used as a control.

Controlled trials were made with each antibacterial cream; neither the participants nor the bacteriologist knew until the analysis was complete who had received active creams and who had received the inactive preparation. Each trial began in the week after the swabbing for selection of persistent carriers.

In the main investigation 457 nurses were swabbed, and 111 (24.3%) were found to be persistent carriers of *Staph. aureus*.

Staphylococcus aureus was as effectively removed from the nares of persistent carriers by repeated application of a cream containing 0.3% gentamicin as by one containing a mixture of neomycin (0.5%) and chlorhexidine (0.1%). In all of the trials the staphylococci were sensitive to the agent used. Resistance to neomycin has lately become common among hospital strains of *Staph. aureus*. Gentamicin is probably the most suitable antibiotic for removing neomycin-resistant staphylococci, and must be considered as the replacement for neomycin in prophylaxis against nasal colonization by *Staph. aureus*. However, although resistance of staphylococci to gentamicin was not found in these trials or in a series of over 5000 strains (many of them neomycin-resistant) from burns examined, the antibiotic is relatively new, and resistant variants may well emerge; a gentamicin-resistant variant was found by Pittman et al. (1964). The use of a cream (naseptin) containing neomycin and chlorhexidine has apparently caused less emergence and spread of neomycin-resistant staphylococci than some other preparations containing neomycin or framycetin. It is therefore probably advisable to use gentamicin in combination with another agent, such as chlorhexidine or vancomycin, to interfere with the emergence of resistant variants.

By analogy with framycetin, gentamicin might be expected to have a larger effect when sprayed into the nares as a solution than when applied as a cream; this point warrants a separate investigation.

None of the other agents tested was as promising as gentamicin, but the numbers included in the trials were too small to allow a statistical assessment of their relative effects. An agent which was not tested but which might be considered to have some potential value as a nasal antiseptic is hexachlorophene. But though the repeated use of hexachlorophene soaps and detergent preparations has been very successful in removing staphylococci

from the skin, repeated application of a non-detergent cream containing hexachlorophene on the dry skin caused no detectable reduction in skin flora; the only useful effect that such preparations had was the prevention of contamination of the skin. By analogy, hexachlorophene cream would not be expected to remove staphylococci from the nose, though it might have some prophylactic value. This question also deserves further study.

YELLOW FEVER IN AFRICA

WHO Chron 21(9): 393-396, Sept 1967.

The dramatic story of the eradication of urban yellow fever from the Panama Canal Zone and then from Central and South America is well known. Jungle yellow fever still exists enzootically, and indeed has spread in recent years, in some parts of America; but human contact with the transmission cycle is negligible and the number of human cases very small. In Africa, on the other hand, the main vector of urban yellow fever, *Aedes aegypti*, has a wider range than in America and is less limited to human habitation, so that it is less amenable to control. The jungle yellow fever of Africa, too, is probably more complex than that of America and is differently related to human beings. The mosquito-monkey complex, for example, is less confined to the forest canopy, and the monkeys emerge from the forest on marauding expeditions, so that they can transmit infection to man.

Epidemic in Ethiopia

While yellow fever in Africa has received relatively little publicity, even its known depredations are far from inconsiderable. In a brief description that appeared in the WHO CHRONICLE in 1964 of an epidemic in Ethiopia, it was stated that between 1960 and 1962 there were 15,000 deaths from the disease. Further investigations have led to an upward revision of that figure; it is now estimated that over 30,000 deaths occurred and that there were over 200,000 cases. This was the first epidemic of yellow fever reported in Ethiopia and the largest ever recorded in Africa.

The Ethiopian Government asked in 1961 for WHO assistance in the study of the epidemic, and a group of experts met in October and 3 other times of that year in Geneva to review the situation and advise on the studies to be undertaken. As a result, WHO support was given to epidemio-

logical, serological, and entomological surveys as well as to virus and other laboratory investigations, the main responsibility for the work being assumed by the Institut Pasteur, Addis Ababa. Strains of virus isolated in the field studies and sera collected in the serological surveys were sent for examination to four collaborating laboratories; the Institut Pasteur, Dakar; the Institut Pasteur, Paris; the East Africa Research Institute, Entebbe; and the Rockefeller Foundation Laboratories, New York. An experimental station was also established in a small valley in southwest Ethiopia in which an active epidemic focus was found soon after the survey started.

It was clearly demonstrated that the main vector during the epidemic was *Aedes simpsoni*, previously incriminated as one of the vectors of jungle yellow fever. *A. aegypti*, the classical vector of urban yellow fever, was either completely absent or present only in small numbers. One of the findings of the studies was that *A. africanus* plays an important part in the natural cycle of the yellow fever virus in the forest; human beings entering the forest can be infected by this mosquito, and in certain circumstances the mosquito flies outside the forest for short distances and can infect man.

Study of the yellow fever viruses isolated established that the strains are antigenically identical or closely related to one another. They are antigenically distinct from South American strains and show some antigenic differences from the West African Asibi strain.

Serological and entomological studies in the affected area indicated that bats play an important part in the natural cycle of some arboviruses. As yet their role in the ecology of yellow fever has not been determined.

Field studies in relation to the epidemic in Ethiopia that ended in 1962 have been completed, but laboratory study of the material collected is still continuing. In the meantime, a further outbreak of yellow fever took place in 1966 and is being combated with WHO assistance. One of the difficulties in dealing with the vector mosquitos is that they breed in the angle between the branches and trunks of the Abyssinian banana tree. *Musa ensete*, grown by the inhabitants as a staple food and found in immense numbers around their thatched houses. Since there is no shortage of rainfall in the area, the mosquitos have an almost unlimited choice of breeding-places; and the remoteness and difficulty of the terrain make control difficult.

Outbreak in Senegal

Yellow fever has been recorded in Senegal since 1778, but no outbreak took place after 1953 till suddenly in 1965 an epidemic swept through Diourbel, a rural area situated 140 km from Dakar near a well-known endemic focus of the disease. The population in this area is fairly dense and is distributed through a large number of villages of from 200 to 1,000 inhabitants, the only town of any size being Diourbel itself, with a population of 19,000. *A. aegypti* abounds in the area where the epidemic occurred, and was the only vector captured by the investigators. Thus, the epidemic, though occurring in a rural area, was of urban yellow fever. Fifty deaths were confirmed as having been due to the disease; 100 deaths were suspected as having been due to it; and there were 24 confirmed cases. A few cases were found away from the epidemic focus, carried by travellers. Of the deaths, 90% occurred in young children, most adults being protected by vaccination; the campaign to keep the population protected by systematic vaccination had lapsed because there had been no outbreak for so many years, and the children were therefore the most susceptible group.

The clinical picture of yellow fever in children is different from that in adults, being less characteristic and less complete than in the usual textbook descriptions. If, as in Senegal in 1965, the outbreak mainly affects children, it therefore runs the risk of not being recognized as yellow fever; in this case its detection was a matter of accident, and laboratory confirmation was required.

To counter the epidemic, a vaccination campaign was instituted. In the 2 months from mid-November 1965 to mid-January 1966, 1,989,500 vaccinations were performed, 120,500 with Rockefeller vaccine and 1,869,000 with Dakar vaccine. The speed with which the campaign was carried out may be gauged from the fact that within a month of notification of the first case 97,000 children had been vaccinated with the Rockefeller vaccine and 300,000 with the Dakar vaccine. The latter was used because not enough of the former—the vaccine recommended for all children under the age of 10 years—was available at the time. With the Dakar vaccine some cases of encephalitis occurred, several of them fatal. DDT was employed against the vector mosquito, *Aedes* being quickly eliminated from the treated villages. More difficulty was encountered in persuading the vil-

lagers to empty and clean the various receptacles round their homes that could have been, and probably were, utilized by the mosquitos as breeding-places. Sanitary barriers were also set up on the main highways, only healthy people with a vaccination certificate being allowed to pass; vehicles were disinfected; and other precautions were taken to prevent the spread of the disease. Only 3 persons who had contracted yellow fever succeeded in passing the barriers, 2 of them dying at Dakar and 1 at the frontier with Mauritania.

Yellow Fever Elsewhere In Africa

The first studies of yellow fever in Africa were carried out in West Africa; only later, with the advent of serological testing, were studies undertaken in East Africa. The serological testing showed that the disease existed over large parts of Central and East Africa, in conditions such that isolated cases or even small epidemics could occur in some areas without the local authorities knowing anything about them. A further observation made was that in the so-called "silent" zones a high proportion of the cases of yellow fever were of so benign a character that they were likely to remain undetected.

The most widespread and severe recorded epidemic before that of Ethiopia in 1960 was one that struck the Nuba Mountains area of the Sudan in 1940. In this epidemic the number of cases was estimated to have exceeded 15,000 and the number of notified deaths was 1,627. The affected area was at that time considered to be a silent zone, earlier immunological investigations having shown widespread but patchy immunity (as much as 80% of the population of some villages being immune); many cases occurred in the epidemic with mild symptoms not lasting more than three or four days. An interesting historical detail in relation to the inhabitants of this part of the Sudan is that Sudanese troops, many of them from the Nuba Mountains area, accompanied French and Egyptian troops to Mexico in 1863. Many of the French and Egyptians died from yellow fever in Mexico, but the Sudanese, presumably because of their immunity, remained untouched by the disease.

Serological investigations have shown the presence of immunity against yellow fever in parts of Kenya and Uganda, and in 1936 a center was established in Entebbe, Uganda, for the study of yellow fever in East Africa. Here it was for the first time shown that mosquitos other than *A. ae-*

gypti could be concerned in the transmission of the disease, and here too the existence was demonstrated of a transmission cycle of yellow fever involving forest monkeys alone. Jungle yellow fever is now known to exist enzootically in the forests of Uganda.

Human cases of yellow fever have occurred in Kenya and Uganda in recent years, as well as in the Democratic Republic of the Congo; but they are few and scattered. The only other epidemic recorded in Africa occurred in the Sudan in 1959, 120 cases and 88 deaths being notified.

RABIES IN VIETNAM

Since the troop buildup in the Republic of Vietnam began, animal bites have been a continuing problem. Numerous Navy and Marine Corps personnel have been bitten, scratched, or licked on open wounds by a wide variety of animals such as dogs, rats, monkeys, and bats, all of which are potential carriers of rabies. As many as one-third of the animal brains examined at the Preventive Medicine Unit Laboratory, Naval Support Activity, Da-Nang, have been found to be positive for rabies by Fluorescent Antibody and Seller's stains. The result of this epidemiological situation is the extensive use of post-exposure prophylaxis employing hyperimmune serum and duck embryo rabies vaccine.

Although the usual incubation period for rabies in humans is 4 to 6 weeks, this period can be much longer. Rabies vaccine and hyperimmune serum is not always effective in preventing rabies in exposed persons. Consequently, medical personnel should be alert to the possibility of development of rabies in personnel returning from Vietnam. Personnel should become familiar with the clinical manifestations of rabies as described in the literature, and should consider the possibility of rabies in any bizarre form of meningoencephalitis.-(Commun Dis Branch, Prev Med Div., Bu-Med.)

SMALLPOX ALERT

Editorial, Ann Intern Med
66(6): 1289-1290, June 1967.

An ancient enemy is staging a brisk comeback this year. During the first 3 months of 1967, 11,270 cases of smallpox were reported to the World Health Organization in contrast with 8,457 for the same period in 1966. Almost all of this increase

is due to the resurgence of epidemic smallpox in the Indian subcontinent. From India, 7,993 cases were reported during the first 3 months, twice as many as for the same period last year. A major epidemic numbering over 1,200 reported cases developed in Bombay.

The relevance of this to the "smallpox-free" world became clear in February and March. Smallpox was imported into Regensburg, West Germany, and Prague, Czechoslovakia, by persons infected in Bombay; a third case, imported into Hanover, Germany, involved a German physician presumably infected elsewhere in India. No secondary cases developed from these importations. The lack of spread from these imported cases is fortunately quite different from other recent experience with imported smallpox in Europe. Since 1960 major epidemics have occurred after importation of smallpox to U.S.S.R. (Moscow, 1960; 46 cases), West Germany (Lammersdorf, 1962; 33 cases), England and Wales (1962-1963; 62 cases), Sweden (Stockholm, 1963; 26 cases), and Poland (Wroclaw, 1963; 99 cases).

The last outbreak of smallpox in the United States occurred in 1949 along the U.S.-Mexico border. However, in August 1962 a teenager from Brazil already ill with prodromic symptoms of smallpox traveled by train from New York City to Toronto where he subsequently developed frank smallpox. Shortly after World War II the U.S. suffered two major outbreaks of smallpox after importations into Seattle and New York City.

In these outbreaks, as in recent European outbreaks, hospital and health personnel played a major role in the transmission of imported smallpox. The National Communicable Disease Center, Atlanta, has analyzed 30 epidemics after importations of smallpox into smallpox-free areas during the years 1940 to 1965. Over half the cases (300 of 516) occurred as a result of spread in hospitals or among health workers. A surprising and distressing number of physicians and nurses developed the disease; many of these died. Where data exist on the vaccination status of these patients, the vast majority are known to have been either unvaccinated or vaccinated in the distant past.

That such outbreaks could happen in the United States appears unquestioned. A series of hospital studies, jointly sponsored by the American Hospital Association and the National Communicable Disease Center, Atlanta, showed that generally less than 1/4th of the personnel working in hospitals had been vaccinated within 3 years; as many as

50% had not been vaccinated within 15 years. Physicians and nurses were generally no better off than the rest of the staff. The epidemiologic "soil" in hospitals appears fertile enough to sustain significant spread of introduced smallpox.

In November 1965 the American Hospital Association, acknowledging this problem, approved a "National Program for the Vaccination of Hospital Workers Against Smallpox." This program offers a feasible, reasonable, and epidemiologically sound means of assuring high levels of protection among the high-risk hospital community. The Association's recommendations reflect experience in both large and small hospitals. With an increased risk of importation this year, the health professions, and especially the hospital community, would do well to scrutinize their vaccination status and practice some appropriate preventive medicine.

INTERNATIONAL COOPERATION IN THE PREVENTION OF CHOLERA

WHO Chron 21(10): 436-437, Oct 1967.

In view of the cholera pandemic that has affected some 20 countries in the past 6 years, WHO convened a Conference on International Cooperation in the Prevention of Cholera, in Ankara, Turkey, from 28 February to 2 March 1967. The conference, which was opened by Dr. M. G. Candau, Director-General of WHO, was attended by ministers of health and secretaries of state from 18 countries.

After noting the progress made in cholera research and control, the conference considered the problems at present facing countries of the European and Eastern Mediterranean Regions in the light of recent experience in cholera prevention.

Specific measures recommended by the conference included:

1. Investigation and surveillance of all enteric and diarrheal diseases.
2. The training of medical, paramedical, and laboratory staff for this purpose.
3. The development of modern rehydration and other treatment facilities of paramount importance for preventing death from cholera (with prompt and adequate action, mortality drops to less than 1%).
4. The construction of sanitation facilities to keep pace with social and industrial development and with the growth of tourism and trade.

5. National and international cooperative research on the viability of the El Tor vibrio in local food products, especially those that enter international trade, and studies on the decontamination of such products and on the survival of the El Tor vibrio in various environmental conditions.

It was recognized that the early and reliable reporting of quarantinable diseases, including cholera, is a moral and legal obligation for every state and country, permitting WHO and the different countries concerned to undertake protective measures in ample time.

KNOW YOUR WORLD

Did You Know?

That during the U.S. Civil War, the Union medical records show a total of 1,213,685 cases of "malarial fevers" from 1861-1866 and 12,199 deaths?

The cause was generally ascribed to "miasmas emanating from stagnant waters," a theory consistent with the derivation of the word, malaria in Italian meaning, "bad air." The relationship of the infection—the globe's number one disease—to the *Anopheles* mosquito, did not come to light until the pioneer work of Sir Ronald Ross in 1902.¹

That according to the surgeon general's report of the Civil War, the annual morbidity rates for diarrhea and dysentery per 1,000 (mean aggregate strength) were 543 among the Northerners and 987 among the Southerners; and the total number of deaths reached at least the 60,000 mark?²

That for 1966, in the United States the crude birth rate was 18.5 per 1,000 population and the crude death rate was 9.5 per 1,000 population; the infant mortality rate was 23.4 per 1,000 live births and neonatal mortality rate was 17.0 per 1,000 live births?³

That a 2-cent bounty on fireflies paid by DuPont Company to about 100 Wilmington, Delaware children last summer cost the company \$12,000?

Six hundred thousand glowing insects made possible the development of a medical analysis technique that will help speed doctors' diagnoses. The procedure will enable technicians to complete urine analyses, blood tests, and bacteria counts in minutes rather than the day or more these procedures now require. Fireflies' hind sections contain a chemical, luciferase, which when combined with synthesized chemicals detects a substance present in all living cells. That substance, ATP (adenosine triphosphate), can be identified almost instantly in

bacteria, using instruments that will be exhibited next year. Under present procedures, bacteria must be grown in a culture until they reproduce in volume large enough to be detected under a microscope. This process often takes 24 hours or more.⁴

That of the estimated 1,635 million people living in the originally malarious areas of the world, 1,251 million (77%) are in areas where malaria has been eradicated or where eradication programs are in progress.⁵

That in Belgium, immunization against poliomyelitis has been made compulsory?

It is started the 3rd month after birth and completed before 18 months of age has been reached. A live attenuated vaccine prepared from virus strains I, II and III is used. After the 3rd administration of vaccine, a dated and signed certificate is given to the parents by the vaccinating physician. Since initiation of the immunization campaigns in 1958, poliomyelitis has practically disappeared from Belgium.⁶

That Lesotho has joined the World Health Organization, bringing the total number of Member States up to 126? There are also 3 Associate Members.

Lesotho, formerly Basutoland, gained its independence on 4 October 1966. It is the 29th independent African country to become a Member of the WHO.⁷

That on 1 August 1967, a "stray" ocelot, traveling 2,000 miles from Texas to Massachusetts without attracting attention, entered a house in Carlisle, and bit a man?

The Humane Society captured the ocelot and a local veterinarian kept it under observation until it died on 7 August. On 9 August, the ocelot's head was examined for rabies at the Massachusetts Department of Health Diagnostic Laboratories.

Fluorescent antibody and mouse inoculation tests were negative. After being advised by a local wildlife expert that such animals are seldom seen north of the Texas Panhandle, inquiries by the Division of Animals Health of the Mass. Dept of Agriculture proved fruitless to locate anyone who had lost an ocelot; however, they did find a serviceman at Fort Devens Army Hospital who had been bitten on 2 August by an animal that "looked like a spotted cat." The soldier reported that a well-known motorcycle group from southern California had visited the Lowell area, and he believed the ocelot was their mascot.⁸

That histoplasmin skin test surveys show that 30,000,000 persons in the United States have had histoplasmosis, and that approximately 500,000 new infections occur each year?

The Ecological Investigations Program, NCDC, Atlanta, estimated that only 25 to 30% of these infections are symptomatic, but approximately 125,000 to 150,000 clinical cases occur each year. Many of these are not diagnosed as histoplasmosis, since this illness mimics many other respiratory diseases and is frequently diagnosed as a "cold" or "flu." Since patients with mild cases recover within 5 to 10 days, only more severe cases are studied adequately enough to establish the correct diagnosis.⁹

That Coxsackie viruses are a group of enteroviruses, worldwide in distribution, which appear to

be frequently associated with poliomyelitis epidemics?

They were named after the town in New York where the first virus of this group was identified and were discovered as research work was done on poliomyelitis. They resemble the viruses of poliomyelitis in many respects, including their epidemiology. They are found in the nasopharynx and feces and at times in other parts of the body. They are divided into 2 groups, A and B. Within each group is a number of types. At least 30 are known. Group B is the more important in man. Coxsackie viruses are said to produce such conditions as aseptic meningitis, epidemic pleurodynia, herpangina, vesicular pharyngitis, encephalitis, hepatitis, an influenza-like fever and myocarditis in infants.¹⁰

References

1. Civil War Medicine, Stewart Brooks, pp 119, (C. C. Thomas Publisher, Springfield, Ill.) 1966.
2. Civil War Medicine, Stewart Brooks, pp 114, (C. C. Thomas Publisher, Springfield, Ill.) 1966.
3. WHO Epid & Vital Stat Rpt 20 (9-10), 1967.
4. National Observer, Dec 18, 1967.
5. WHO Chronicle 21(9): 373-388, Sept 1967.
6. WHO Chronicle 21(11): 467, Nov 1967.
7. WHO Chronicle 21(10): 427, Oct 1967.
8. USDHEW PHS NCDC Veterinary Public Hlth Notes, p. 1, Nov 1967.
9. USDHEW PHS NCDC Veterinary Public Hlth Notes, p. 5, Nov 1967.
10. JAMA 203(1): 8, Jan 1, 1968 (Smith, A. L.: Principles of Microbiology, Ed 5, St. Louis: C. V. Mosby Co, p 438, 1965).

EDITOR'S SECTION

MEDICAL TEXTS REQUESTED BY THE UNIVERSITY OF SAIGON MEDICAL SCHOOL

A request has been received from CAPT R. K. Brooks, MC USN, Fleet Medical Officer; Headquarters, COMNAVFORV Box G; APO San Francisco, California 96214, noting a continuing need for medical texts in Vietnam.

Medical Department Activities are encouraged to ship books which have been replaced by new editions DIRECTLY to CAPT Brooks of the above address for presentation to the Saigon Medical School.

MAGNESIUM—ITS NUTRITIONAL AND PHARMACOLOGIC EFFECTS

Magnesium is probably one of the least under-

stood of the nutrients which appear to be essential in man. About 20 to 40 mEq are ingested daily in an average diet, an amount which normally is more than adequate. A deficiency or an excess of magnesium can occur, however, and can produce serious clinical effects which may be incorrectly attributed to other causes. A deficiency of magnesium probably results most often when gastrointestinal fluid and electrolyte loss is treated with magnesium-deficient parenteral fluids. Excess usually occurs in patients with chronic renal insufficiency who have habitually used antacids or cathartics containing magnesium compounds.

Magnesium helps regulate neuromuscular transmission and it is essential to the activation of numerous enzyme systems, particularly those associated with adenosine triphosphate (ATP). In

pharmacologic doses magnesium acts as a central-nervous-system depressant. Total body stores of magnesium in an adult amount to about 2000 mEq, more than half of it in bone. Almost all of the magnesium in soft tissue is intracellular (including that in red blood cells), and plasma magnesium concentration is normally only about 1.5 to 2.2 mEq per liter. Large changes in body magnesium stores, as demonstrated by muscle biopsy assay, sometimes occur, and they may or may not be reflected in plasma levels (J. L. Caddell and D. R. Goddard, *New Eng. J. Med.*, 276:533, 535, 1967). Magnesium metabolism is closely linked with the metabolism of calcium and potassium, but the precise relationship is obscure.

Magnesium Deficiency—Deficiency of magnesium is probably more frequent than excess, and is characterized by muscle cramps and carpopedal spasm, positive Chvostek and negative Trousseau signs, and low voltage patterns in the electrocardiogram. Delirium, muscle tremor, bizarre muscle movements and convulsions may also occur.

Severe diarrhea, prolonged vomiting, and nasogastric suction (as after surgery) may lead to magnesium deficiency, especially when the patient is treated with magnesium-deficient fluids. Patients with malabsorption, regional enteritis, and ulcerative colitis are particularly vulnerable. Severe magnesium deficiency may also develop in comatose diabetic patients receiving fluid therapy and large doses of insulin. Edematous patients intensively treated with diuretics may occasionally develop magnesium deficiency. In tropical countries magnesium deficiency is common in malnourished children.

Renal loss of magnesium sometimes contributes to the development of a deficiency state. Magnesium deficiency often occurs in chronic alcoholics, perhaps as the result of inadequate diet; however, alcohol also increases the urinary excretion of magnesium (L. G. Welt and H. Gitelman, *Disease-a-Month*, Chicago: Year Book Medical Publishers, May, 1965).

While plasma concentrations of magnesium may not indicate the level of body stores, magnesium depletion is usually associated with serum levels lower than 1.5 mEq per liter. When clinical evidence suggests magnesium depletion, the finding of urinary magnesium excretion of less than 1 mEq per day may assist in the diagnosis. If laboratory studies are equivocal, a clinical impression of magnesium deficiency warrants a trial of 40 to 80

mEq of magnesium administered intramuscularly (10 ml of a 50% solution of hydrated magnesium sulfate contains about 40 mEq). (If given intravenously, a 40-mEq dose should be diluted with one liter of saline or 5% dextrose and infused slowly over a period of about three hours.)

Magnesium Excess—An excess of body stores of magnesium is usually due to long-term use of large doses of medications containing magnesium, such as milk of magnesia, by patients with renal insufficiency. Respiratory depression and death have followed the use of magnesium sulfate enemas in the treatment of hyaline membrane disorders of the newborn (W. F. McGuire and H. R. Goldberg, *Amer. J. Dis. Child.*, 109:586, 1965; M. M. Nichols, *Pediatrics*, 35:1023, 1965). Symptoms of magnesium intoxication include difficulty in defecation or urination and the absence or depression of deep tendon reflexes (R. E. Randall, Jr. et al., *Ann. Intern. Med.*, 61:73, 1964); drowsiness, heart block, and respiratory paralysis may also occur.—The Medical Letter 9(23), (Issue 231), 1967.

AMATEUR RADIO OPERATION ABOARD HOSPITAL SHIPS

Rear Admiral George H. Reifenstein, MC USNR-R, Technical Director, Clinical Research and Medical Education, National Naval Medical Center, Bethesda, Maryland published an article in the October 1967 issue of "QST", the official organ of the International Amateur Radio Union, describing facilities for amateur radio operation aboard the USS Sanctuary and USS Repose. He stated that 15 to 20 messages per day are typical of the traffic and messages relayed by 'hams' all over the United States.

In reply to this article, James H. Mold of Kennington Park Road, London, England wrote Adm. Reifenstein that as a former P.O.W. of the Japanese in September 1945, he was taken aboard the USS Sanctuary at Nagasaki and transported to Okinawa. Mr. Mold states, "If it were not for the hospital staff on 'Sanctuary' I could not write this letter. I remember the voyage from Nagasaki to Okinawa with a pleasant memory. I think that without the proper treatment which I got from the staff on USS Sanctuary, another week would not have passed."

This brief incidence indicates in some small measure the high regard held for our hospital ships of the U.S. Navy.

DEPARTMENT OF THE NAVY
BUREAU OF MEDICINE AND SURGERY
WASHINGTON, D.C. 20390

POSTAGE AND FEES PAID
DEPARTMENT OF THE NAVY

OFFICIAL BUSINESS

PERMIT NO. 1048